



## Technology in Action

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### Universal Design for Learning Features and Tools on iPads and Other iOS Devices

Teachers and schools are adopting iPads at an increasingly rapid rate. However, successful implementation varies. Two reasons that often hinder successful implementation are lack of training on how to use the device and the lack of a pedagogical framework on how to include the device to meet the needs of diverse learners. Rather than believing the iPad is going to drastically change education on its own, it is more reasonable to think of the iPad as a tool that supports what educators are already doing in the classroom. This article uses the research-based instructional framework of Universal Design for Learning (UDL) to demonstrate how the iPad can be used as a tool for reaching diverse learners, including those with disabilities. Using the UDL framework, we highlight built-in features and applications (apps) for each of the guidelines. The iPad and other iOS devices are ideal tools for making any classroom an excellent environment for 21<sup>st</sup> century learners.

Educators at all levels are adopting mobile devices and finding exciting ways to use them in their instruction. This is leading to widespread change in education. The fluidity and success of implementing these devices varies. Two potential issues with the effective implementation of mobile technology in learning are lack of training on how to use the device and the lack of a pedagogical framework on how to include the device to meet the needs of diverse learners. Rather than thinking that mobile devices are going to drastically change how and what educators teach their students, it is more productive to think of mobile devices as

tools that support what educators are already doing in the classroom. Mobile devices offer many benefits for existing instructional practices. These tools have great potential to create learning environments that are not just located in a school, but persist wherever the learner has the device (Ogata & Yano, 2004).

The pedagogical framework we use to explore this topic is the established research-based instructional framework of UDL (Center for Applied Special Technology, 2011). For the purpose of this article, mobile devices will refer generally to a wide variety of phones, tablets, and readers. However, in order to provide specific examples, we will focus on the design features of the iPad and iPhone. Our purpose is not to advocate the use of one type of device, but to highlight existing capabilities of mobile devices that are examples of UDL. We selected iOS devices because of the multitude of built-in accessibility features, the large collection of education related applications (apps), and their common presence in many schools. Using the UDL framework, we highlight built-in features and apps for each of the guidelines. The iPad and other iOS devices are ideal tools for making your classroom an excellent environment for today's learners.

Innovative technologies create environments that are more conducive to learning by allowing students to learn at their own pace, repeat steps as necessary, and develop a feeling of control over the learning process (Claes, Van Hove, Vandeveld, van Loon, & Schalock, 2012; Pantelidis, 1993; Wehmeyer, Palmer, Smith, Parent, Davies, & Stock, 2006). Research has shown many advantages for using technology, including the



fact that using technology can contribute to more positive vocational and employment related outcomes for youth (Wehmeyer et al.). The use of technology in the classroom also can help students learn executive functioning skills (e.g., planning, organizing, paying attention to details) that are critical to academic and life success (Bauer & Ulrich, 2002; Gillette & Depompei, 2008). Carey, Friedman, Bryen, and Taylor (2005) concluded after their survey on technology that individuals with disabilities take pleasure in using today's electronic tools and, "benefit in their work, school, community, and leisure activities from these technologies" (p. 331).

Technology resources can help prepare students to be active, creative, knowledgeable, and ethical participants in a globally networked society. Therefore, it is important to consider the benefits of technology when designing learning environments. Allowing students to utilize technology may especially benefit learners who struggle with environments not designed to meet their learning needs and styles (Bauer & Ulrich, 2002; Fitzgerald, Koury, & Mitchem, 2008). The use of technology is vital to the implementation of UDL, as it provides teachers with the flexibility to make the curriculum accessible to learners with varying needs.

## Universal Design for Learning

UDL refers to three principles for planning instruction as established by CAST (2011):

- Provide Multiple Means of Representation.
- Provide Multiple Means of Action and Expression.
- Provide Multiple Means of Engagement.

Proponents of UDL support the view that the abilities of learners vary due to differences in brain structure and individual experience. Recognizing the diversity of individual neurocognitive differences, the UDL approach to curriculum design includes planning for multiple means of representation, action and expression, and engagement throughout the lesson. This method is in contrast to traditional approaches of identifying learners as disabled or gifted and then tailoring instruction to differences as a reaction to the diversity (Hehir, 2005). The UDL approach to curriculum puts an emphasis on making the curriculum accessible for all individuals from the outset

of instruction rather than prescribing strategies for struggling learners after failure in the general curriculum has occurred (Burgstahler & Cory, 2008; Gordon, Gravel, & Schifter, 2009). UDL recognizes that individual learner differences are a natural part of the human experience, and meeting the needs of diverse learners should be approached through proactive curriculum design rather than reactively after failure has occurred (Hehir; Rose & Gravel, 2010).

The instructional framework of UDL can be adopted and supported by applying principles of accessibility to instructional activities and technology. In 2008, the first policy definition of UDL was established by the U.S. Congress in the Higher Education Opportunities Act (HEOA). The HEOA states that UDL is a scientifically valid framework for guiding educational practices and the principles of UDL:

- a. Provide flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and
- b. Reduce barriers in instruction; provide appropriate accommodations, supports, and challenges; and maintain high achievement expectations for all students, including students with disabilities and students who have limited English proficiency (HEOA, 2008, p. 110).

In 2010, Maryland became the first state to pass legislation that included using UDL as a tool for educational reform (Maryland State Department of Education, 2011). Another piece of supporting policy for UDL is the U. S. Department of Education's National Education Technology Plan (NETP), in which UDL is featured as one of the guiding principles for creating assessments that measure student knowledge rather than student skill at taking tests (NETP 2010, p. 34). The NETP calls for states, districts, and schools to utilize learning resources that will enable all learners to have engaging and empowering learning experiences both in and out of school. The NETP supports important implications that UDL and mobile devices have to support learners in formal and informal settings.

UDL is well established in research and policy but implementing it effectively remains a challenge for educators. While the principles of UDL do not always require technology-based tools to be implemented, the UDL principles are suited as tools to assist educators in implementing instructional technology (Rose & Meyer, 2006). Although

there are multiple ways to implement UDL in the classroom and multiple types of technology that can assist in this process, this article will present just a few of the many ways that the iPad and iOS devices can support a UDL-designed learning environment.

### ***UDL Principles and Guidelines***

For educators who may not be familiar with the UDL guidelines, we want to provide a brief overview of the three principles we introduced earlier and are described by Rose and Meyer (2006). The first UDL principle—Multiple Means of Representation—emphasizes the importance of flexible methods of displaying information to make the “what,” or content of learning, available to all learners. The second principle of UDL—Multiple Means of Action and Expression—addresses methods of providing options for how learners demonstrate their knowledge, organize their thinking, and interact with content or the “how” of learning. The third principle of UDL—Multiple means of Engagement—presents flexible options for enticing and creating interest, persistence, and excitement about learning.

The National Center on Universal Design for Learning at CAST publishes the UDL guidelines that help provide additional details to the three broad principles of UDL (CAST, 2011). To utilize the principles of UDL as instructional guidelines, it is useful to examine a few of the built-in features of the iPad and other iOS devices, as well as the instructional applications available on these devices, as they can help facilitate meeting the UDL guidelines. In this article we aim to guide educators by providing examples of how iPads and some apps may be used to implement these guidelines.

### ***Increasing Student Engagement through UDL and iOS Devices***

Mobile devices such as the iPad and iPhone are excellent educational platforms because of the many ways they embody the principles of UDL. Students with disabilities, students reading below grade level, English language learners, and potentially all learners can use mobile devices as a means of tailoring how they learn required curriculum. A simple example is that some students may need to process a question in an auditory manner in addition to reading it, and mobile devices provide several options for meeting this need. As a result, using iOS devices such as the

iPad and iPhone is an excellent way to meet the nine UDL guidelines discussed below.

For each principle of UDL that follows, we provide a classroom scenario, then briefly describe each guideline associated with the principles and give an example of one built-in feature or app by Apple and one third party app that could address that guideline. A more comprehensive list of built-in features or apps that come installed on iOS devices is provided in Table 1. Table 2 shows third-party apps that must be downloaded to the device. These features and apps can enhance the Universal Design of a teacher’s curriculum. The tables provide a few examples of apps or built-in features for each guideline; they are not intended to be exhaustive lists.

### ***Multiple Means of Representation***

**Story of Carly:** An example of multiple means of representation.

Carly is an eighth grade student who studies and pays attention in class but consistently scores poorly on written assessments. She is in a resource room for language arts class but participates in general education math, science, and social studies classes. While her accommodations include read-aloud testing for written assessments, she often refuses this accommodation because it requires her to be reseated in the back of the special education classroom or to take the test in the hallway. As a result, she feels embarrassed and estranged from her peers. Carly’s school does not have enough special education staff to provide a teacher or aide in every class, and read-aloud testing accommodations in math, science, and social studies is fast becoming a major issue for Carly and many other students. Carly understands the content but has difficulty decoding test questions. In a special education meeting to address read-aloud testing accommodations, one of the school’s instructional coaches asks for permission to pilot a project using the school’s tablet computers and other mobile technologies. These devices allow students to listen to podcast recordings of a test while completing a paper copy. When offered this option, Carly is happy to try it since the iPad is engaging to her, she knows how to use it,

Table 1

## Built-in Features and Apps Matched with UDL Guidelines

## UDL Guidelines

Multiple Means of Representation			Multiple Means of Action and Expression			Multiple Means of Engagement		
1. Options for Perception	2. Options for Language, Math Expressions, Symbols	3. Options for Comprehension	4. Options for Physical Action	5. Options for Expression and Communication	6. Options for Executive Functions	7. Options for Recruiting Interest	8. Options for Sustaining Effort and Persistence	9. Options for Self-regulation
Zoom*, White on Black*, <i>Speak Selection*</i> , <i>Voiceover*</i>	<i>Music App</i> , Dictionary	<i>iBooks</i> , Safari	Photo Booth/ Camera, Multi-touch Inputs,* GPS, Accelerometer-based apps	Notes, <i>Siri</i> , Contacts, Messages,	<i>Calendar</i> , Reminders, Notes	Maps, Music App, Podcasts, <i>Safari</i>	iTunes U, Guided Access*	Timer, Alarm, Stopwatch, <i>iMessage</i> ,

Note. Items with an asterisk are built-in accessibility features under the Settings app. Italicized items are discussed in the text. Nonitalicized items are additional suggestions by the authors.

Table 2

## Third-Party Apps Matched with UDL Guidelines

## UDL Guidelines

Multiple Means of Representation			Multiple Means of Action and Expression			Multiple Means of Engagement		
1. Options for Perception	2. Options for Language, Math Expressions, Symbols	3. Options for Comprehension	4. Options for Physical Action	5. Options for Expression and Communication	6. Options for Executive Functions	7. Options for Recruiting Interest	8. Options for Sustaining Effort and Persistence	9. Options for Self-regulation
<b>Read2Go (Bookshare)</b> , <i>Kurzweil Firefly</i>	Proloquo2Go, <i>GarageBand</i> , Dictionary, World Lens	<i>Audionote</i> , Google Earth App, Khan Academy, Showme	<i>String AR</i> , <i>Showcase</i> , Aurasma, Heads up Navigator	<i>Dragon Dictation</i> , Teacher/Student Clicker, My Story Book	<i>Evernote</i> , Wunderlist, Dropbox, My Homework	Google Search App, <i>Flipboard</i> , Zite, Docreri	ABA Animals, <i>Tellpic</i>	Wait Strip, <i>Calm Counter</i>

Note. Italicized items are discussed in the text. Nonitalicized items are additional suggestions by the authors.



and she can remain in the classrooms where she learns math, science, and social studies. Using the iPad, Carly is able to continue to feel a part of the class socially while also improving her test scores.

### **Guideline 1: Provide options for perception**

Learning can become inaccessible if the content is presented in ways that learners struggle to perceive and understand. This guideline emphasizes the use of different methods for presenting content including visual, auditory, and tactile approaches and options for allowing the learner to adjust the format of these modalities to suit their learning needs. Providing options for perception removes barriers to learning and increases the accessibility of content for all learners.

#### ***Built-in Options: Voice Over and Speak Selection***

These are standard features of the iOS operating system that are installed on all iPads. To select these options go to the Settings button, select General, then scroll to the Accessibility. Voiceover and speak selection allow students to have text information read aloud. Students can vary the speed of speech to suit their individual processing needs. Students can quickly toggle this setting on or off using a built-in setting option called Triple Click Home for voiceover, or they can simply touch and highlight text to be read for using the speak selection accessibility feature. Educators can use these options to increase the opportunities learners with print disabilities (e.g., reading disability, visual impairment) have to interact with text-based information when reading independently is too challenging (Baird & Henninger, 2011). Other accessibility features include changing the background color to black with white text, or magnifying the screen for students with poor vision. By providing options for perception, iOS devices by design provide the flexibility to meet diverse learner needs described by UDL. These features can be found by pressing the Settings icon, selecting the General tab from the menu on the left, and then scrolling down to Accessibility.

#### ***App Option: Kurzweil Firefly***

Educators also can download free or low priced apps to provide options for their students. One example is the Firefly app by Kurzweil. The Firefly app is free to use

as you access and read the digital files you have stored in the Kurzweil 3000's universal library. The Kurzweil brand ([www.kurzweiledu.com](http://www.kurzweiledu.com)) is one of the most popular software providers for students with disabilities, English language learners, and struggling readers. Kurzweil's scan and read software allows students to scan text, process images, and use speech-to-text capabilities to make content more accessible. The Firefly app allows all files stored in a Kurzweil library to be accessed on a mobile device.

### **Guideline 2: Provide options for language, mathematical expressions, and symbols**

Differences in background knowledge, language, and ability mean that language, pictures, and/or mathematical expressions may not have the intended meaning for all learners. By presenting information in multiple forms educators increase the accessibility of curriculum. Possible implementations of this guideline include using hypertext links for unfamiliar terms, making content connections to previous material, electronic translation tools, and using multiple media (CAST, 2011).

#### ***Built-in Options***

The iPad can be used to provide assessment options for students using the built-in music app. Testing accommodations that feature the UDL principles demonstrate the positive outcomes of multiple representations of text. Dolan, Hall, Banerjee, Chun, and Strangman (2005) found that providing test questions in an audio format as well as in text format increased high school test scores in math comprehension for students with reading disabilities. The capabilities of iPad, iPod Touch, and iPhones allow students to use audio files, specifically enhanced podcasts, on an iOS device to listen to test questions while completing the paper version of a test. This natural accommodation has been shown to be an effective testing accommodation compared to the established practice of teachers reading the test questions aloud (McMahon, 2011).

#### ***App Options***

GarageBand is a popular application (\$4.99) available for download on iTunes. Educators can record a test using GarageBand to create podcasts, or the iPad's built-in audio recorder for simple recording. These podcasts can have each question on an exam set identified with chapter



markers, allowing students to select, play, pause, or repeat the audio of their tests. In addition, the use of headphones allows students to stay in the general classroom while participating in assessments.

### **Guideline 3: Provide options for comprehension**

Allowing learners options for comprehension and demonstrating comprehension may mean utilizing additional resources available on mobile devices. These resources include tools for organization, interactive diagrams or simulations, tools to scaffold instruction, and resources that create opportunities to regularly connect new material to related topics.

#### ***Built-in Options***

iBooks is a built-in feature on the iPad. iBooks features a dictionary for students to access words that they do not understand. Students only need to select the word they do not understand and the dictionary feature will provide a definition instantly. During reading activities, teachers can teach new vocabulary to the class by calling on students to select challenging words from the readings and provide the class with the definition. iBooks is an example of building comprehension options directly into instructional materials.

#### ***App Options***

AudioNote (Lite, free/ Full, \$4.99) by Luminant Software (<http://luminantsoftware.com/iphone/audionote.html>) is an application that can help students take notes and record lectures at the same time. AudioNote allows learners to have the advantage of audio recording and typing notes, or writing notes by hand at the same time. As students review the material, they have access to both audio and written material in one application.

### ***Multiple Means of Action and Expression***

**Story of Dontae:** An example of multiple means of action and expression.

Dontae is a fourth grade student with autism who is primarily nonverbal. Some of his Individualized Education Program (IEP) goals include engaging in two or more exchanges of communication on topic, adding single-digit

numbers with sums up to 10, and identifying food words correctly from a teacher-made list. Dontae had limited success using a picture exchange system because he resisted or only reluctantly used the Velcro cards. His teacher and applied behavior analysis therapist decided to work on his communication goals using an iPad with a voice output communication app. They experimented with a few different apps, and after some testing decided that Proloquo2go, was a good fit for Dontae's goals. Rather than reluctantly using picture cards, Dontae actively engaged using the iPad to express himself. He particularly seemed to enjoy having a "voice," as the app spoke his selections aloud. Dontae's progress on his IEP goals improved and now rather than reluctantly using communication tools, he actively engages in conversation on topics of interest.

### **Guideline 4. Provide options for physical action**

Instructional materials should allow learners to interact with content in a variety of ways, including physically. Twenty-first century learning materials can provide new physical methods of how students engage with content and express that information. Mobile devices, by definition, are portable learning tools that students can carry with them to extend learning opportunities outside of the classroom. Creative educators can apply these capabilities to allow students to create hundreds of options for physical action. Options for physical action also address needs for access to assistive technologies. The update to the iOS operating system will include switch access support for the first time, which will allow users who may have difficulty with fine motor skills to access mobile devices to meet their needs.

#### ***Built-in Options***

Photo Booth is a simple-to-use photo tool that uses the iPad's camera (iPad second and third generation). Photo Booth can be used to take pictures of notes, drawings on the board, or completed hands-on science activities, models, or projects. Students can use the camera to present a timeline or sequence of events or ideas. There are many educational benefits in allowing students to use digital cameras to support their learning, including note taking and sequencing a set of visual instructions (Salovaara, Helfenstien, & Oulasvirta, 2011). The features of the

built-in Photo Booth app provide students an additional way of expressing their learning through physical action by taking pictures in different locations by taking pictures to support their note-taking or studying efforts. While taking and editing pictures may not seem like an action-oriented exercise at first, educators are only limited by their own creativity when applying these tools to student learning both in the classroom and in the community. Taking photos often requires students to move to locations and look for different angles, a simple but effective way to increase physical action. For example, sending students on a misspelling photo scavenger hunt is a way to use mobile devices to connect the reading content from the classroom to the community.

### ***App Options***

Another means of providing options of expression is applying augmented reality applications as a means of allowing students to express their ideas. One example is using the free app, String Augmented Reality Showcase, by String Labs Inc. (<http://www.poweredbystring.com/showcase>). Students control interactive three-dimensional characters by moving and placing printed markers and then viewing them with this app. Teachers can create lessons that include having the students use the characters to answer questions, make choices, or express ideas while moving the device and potentially moving around the classroom instead of remaining stationary at a computer station or desk.

### ***Guideline 5: Provide options for expression and communication***

Just as multiple means of representation are critical for diverse learners to understand content, providing options for multiple methods of demonstrating and communicating with educators is necessary for all students to have equal access to education. If students are limited to only one method of expressing their learning, educators are only assessing who is effective at using that particular means of expression rather than truly assessing if the student is learning. By providing and allowing multiple methods, students have opportunities to show their learning by expressing themselves in new modalities.

### ***Built-in Options***

Apple's Siri personal digital assistant provides newer iOS devices with the ability to recognize the user's speech as long as the device is connected to the Internet. The voice input and search tools of Siri embody many of guidelines of UDL and have promise as tools for empowering students with disabilities. Students can use Siri for reference information, directions, weather, or to send messages. Also built in to iOS devices with Siri is the ability to dictate using a voice-to-text feature that students can use to compose messages and documents without having to type on any application using the keyboard. Students have the option to type or press the microphone button to dictate.

### ***App Options***

The free Dragon Dictation app by Nuance Communications ([www.nuance.com](http://www.nuance.com)) allows students to easily use speech to express their thoughts in written form. The student speaks into the device and the application dictates the words to text. The Dragon Dictation app allows students to type or make corrections if necessary, and once they have the written text edited to their satisfaction they can share it through email or social media, or copy and paste it into another document. This app allows students with writing disabilities to bypass the need to write their responses, but still allows them to express what they know.

### ***Guideline 6: Provide options for executive functions***

Executive functions allow students to prioritize, plan, problem solve, and complete complex activities. Building in prompts, mentoring opportunities, goal setting, information management, and scaffolding instruction are a few examples of how educators can support the growth of learners' executive functioning skills. The tools available for these activities on mobile devices can allow teachers and students to collaborate effectively to improve executive functioning skills for their learners.

### ***Built-in Options***

Features in the iOS operating system such as the calendar, alarm clock, and camera can all help to develop or augment students' executive functioning. The iPad's built-in calendar allows students to set reminders for tests or projects due, make notes about relevant times or dates,



and review previous major ideas covered on specific days. Teachers can use a shared calendar using a Google calendar or similar account to provide the entire class with access to an always current calendar of class activities, goals, assignments, and tests. Additionally, each student can create his or her own personalized calendar to access and use on the iPad or on other devices, including phones and computers, both at home and at school. There are multiple other built-in organizational tools including apps for notes, timers, and voice memos. Another simple tool to consider is the reminders built-in feature, which makes easy-to-use checklists that students can organize by date, subject, or another method of their choosing.

### ***App Options***

Evernote (Free) by Evernote (<http://www.evernote.com>) is a robust web-based note-taking and general organization tool that can be applied to many instructional tasks. Students can save a variety of resources, including links to websites, pictures, and audio and video resources to organize instructional materials and research. Since Evernote is a web-based tool, students can use their personal mobile devices, computers at home or school, or a school's mobile devices to access their information. Students can also use their Evernote account to access Evernote's others apps such as Skitch (screenshot annotation), Penultimate (handwriting note taking), and Evernote Web Clipper (save resources from the Internet to directly into Evernote). A student preparing to write a research report can use Evernote to receive instructions from the teacher, collect resources, take pictures and label them, and draft and edit research and email it to the teacher.

### ***Multiple Means of Engagement***

**Story of Austin:** An example of multiple means of engagement.

Austin is an expressive tenth grade student with dyslexia. Austin enjoys theater and is active in all school productions. He does well in math and science but struggles in language arts because of his disability. Although Austin is a good-natured student and enjoys storytelling in his theatrical pursuits, he has developed a dislike for classes that involve a large amount of reading and writing. Austin is successful in most other curricular and noncurricular

activities, so when he struggles in a class, he tends to get frustrated and shut down.

This year in his English class, his teacher is allowing students to come up with their own unique ways to use their school-issued iPads. Although the teacher is demanding and the content challenging, Austin enjoys the freedom he experiences using the iPad. Instead of having to write out all of his vocabulary words, Austin gets permission to video himself on his iPad using the words in a sentence, both at school and in the community. He downloads all the required readings from iTunesU and listens to them as audio files. Austin also uses text-to-speech apps such as Dragon Dictation to speak out his essays before he edits his work. This cuts down on both the time it takes for Austin to complete his assignments and the frustration he feels. Working on the iPad has allowed Austin to engage in the content instead of the input of the content. He is less frustrated and he has received consistently high marks for his understanding of the material.

### ***Guideline 7: Provide options for recruiting interest***

Students need learning activities that engage them; otherwise they will not benefit from the content (Green, Liem, Martin, Colmar, Marsh, & McInerney, 2012). This guideline is important for building the capability of independent self-directed learning necessary for students to become lifelong learners.

### ***Built-in Options***

Some of the advantages for iPads in recruiting student interest include the flexibility that comes from the mobile nature of the iPad and its ability to connect to additional apps and information on any topic the student is learning (Gawelek, Spataro, & Komarny, 2011). As new topics are introduced in class, students can use Internet browsers to learn more about them. Learners have dozens of tools and methods of engaging in their own learning. For example, two students could be searching for information on the planet Saturn and could use tools like the iOS's default



web browser, Safari, to type in the search term “Saturn” and explore results.

### ***App Options***

Another way to generate and maintain student interest is by providing high-interest topics tailored to the individual. This practice increases student engagement and persistence when reading challenging text. Flipboard, by Flipboard Inc. (<http://flipboard.com>), and Zite, by Zite Inc. (<http://www.zite.com>), are both free mobile applications available on the iPad that allow students to create a magazine that automatically finds content based on the interests selected by the user. Teachers and students could use these tools to create custom high-interest appropriate reading. Once the learner has selected the topics he or she wants to learn about, it is possible to read or listen to articles (using the Voice Over feature) on these topics.

### ***Guideline 8: Provide options for sustaining effort and persistence***

This UDL guideline addresses engagement by providing options for offering difficult or challenging material, building community and collaboration opportunities, giving mastery-oriented feedback, and setting and monitoring goals and objectives. The concept of mastery-oriented feedback in educational curriculum is supported in the NETP’s description of the benefits of electronic learning records (NETP, 2010).

### ***Built-in Options***

iTunesU by Apple is a free app that neatly organizes courses, including elementary, secondary, and college content. iTunesU content includes videos and downloadable documents that students can use to vary the challenge in their learning activities. These resources and similar collections of lessons allow students to access instructional material outside of the classroom. Accessing material outside the classroom allows students to review instructional videos at their own pace. Students can foster a sense of collaboration and community by visiting the classroom website using the built-in Internet browser. Students can email their work to their parents or teachers from the built-in mail app and share their learning.

### ***App Options***

Student engagement can be increased through sharing and collaboration (Fuchs et al., 2001), and iOS applications provide many opportunities for collaborative learning. Tellpic (Free) by Tellpic LLC (<http://tellpic.com>) is one app that can be used to provide collaborative opportunities. This app records student audio descriptions of pictures that they take or bring into the application. The students can then share their Tellpic audio notes and pictures with their classmates or teachers. Collaboration and cooperative learning can be facilitated using the iPad to support the curriculum and instruction from the classroom teacher. Educators can use the students’ interests in technology and in sharing their pictures to engage students. For example, a teacher of an elementary student could use the Tellpic app as a story starter for a tandem creative writing assignment completed by several students, and a middle school teacher could allow an option for the cooperative group to describe the central nervous system.

### ***Guideline 9: Provide options for self-regulation***

Learning can become inaccessible to students if they are repeatedly overwhelmed by negative learning experiences. Providing tools for self-regulation allows learners to apply proactive strategies to help regulate their stress and keep them engaged in their learning. Using self-reflection tools to manage frustration and developing coping skills to help stay on task is easier when teachers are willing to use iOS devices.

### ***Built-in Options***

Using the iPad provides multiple methods of self-regulation using built-in features. Since many students struggle with noise, a simple way to increase self-regulation is to use headphones to reduce distractions. Although headphones are not unique to mobile devices, headphones and appropriate music are easily managed on a portable device. For students struggling to cope with frustration or other adversity, educators can teach them to use the iMessage app to communicate with a preferred staff member to request help privately. The iMessage app is a green icon on the iPad or iPhone page. Rather than engaging in a physical or verbal outburst, students can send a request for a break, a helping hand, or a cool-down walk.



### App Options

Self-determination has been found to have positive impacts on student engagement and achievement (Agran, Cavin, Wehmeyer, & Palmer, 2006). There are multiple apps available for mobile devices, including the Calm Counter app by Touch Autism (<http://touchautism.com>), which uses the principles of applied behavior analysis to help students self-manage their needs. Another aspect of self-regulation is allowing students to practice self-determination in their learning. One aspect of self-determination is for teachers to build in opportunities for students to make choices. Teachers can design educational opportunities using the iPad to build in choices for students to write, create videos or presentations, or create graphics to express their content knowledge or to complete assignments.

## Conclusion

### *Educational Leadership, Mobile devices, and UDL*

Educators using mobile devices have more options to increase student engagement and apply the principles of UDL. We are hopeful that designers of mobile devices and technology in general will consider UDL when they are designing future devices in order to make them accessible to the greatest number people. Whether producing a device for broad commercial audiences or an assistive technology dedicated for people with disabilities, design elements need to be focused on applying the UDL guidelines to provide flexibility for individual learning characteristics and the changing needs of the user. The capabilities of iOS devices include photography, video, multi-touch input, Internet access, and more than 700,000 applications that educators can apply to increase student engagement and achievement.

Teachers can apply these new educational tools along with their curriculum knowledge to create innovative and engaging educational opportunities. These opportunities can help provide flexibility for the wide range of skills and learning strengths of learners. Universal Design for Learning is recognized as a critical design feature for the future of education in the United States, as demonstrated by the HEOA (2008) and the NETP (2010). The capabilities of the iPad and other iOS devices present educators with a new means of providing content to learners with the flexibility and engagement described in the UDL guidelines.

The potential of these mobile technologies to meet UDL guidelines is limited only by the creativity and imagination of the educators who use them.

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