Assistive TECHNOLOGY

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CHAPTER 7

Assistive Technology to Support Behavior and Organization

Chapter 7 focuses on assistive technology to support students with disabilities in terms of behavior and organization, broadly defined. Specifically, Chapter 7 explores a range of low-tech to high-tech assistive technology to support students with skills related to organization, self-management and self-monitoring, and social skills. This chapter also addresses sensory-based assistive technology as well as technology to support teachers with classroom management. The chapter presents stand-alone technology options as well as apps to support behavior or organization.

This chapter will examine technology to support students with behavior, which includes developing social skills, self-control, attention, socioemotional development, and sensory integration as well as such areas as self-monitoring, planning and prioritizing, and organization (Morin, 2014; O'Reilly et al., 2014). Throughout this chapter, we will focus on a variety of students with disabilities—including students with autism spectrum disorder, emotional/behavioral disorders, and ADHD, among others—who may need support for behavior or executive functioning. Assistive technology can and should play a role in supporting students and teachers in addressing behavior and organization, both broadly defined.

Chapter Objectives

After reading the chapter, the reader will be able to do the following:

1. Provide concrete examples of low-tech and high-tech assistive technology to support students in terms of organization and self-monitoring
2. Consider the different technology teachers can use to monitor, manage, and support classroom behavior
3. Understand the potential and limitations of sensory-based assistive technology

Organization

Different technologies can assist in helping students with disabilities get and stay organized, including low-tech assistive technology. Low-tech assistive technology

Case Study 7.1

- Missy is a ninth-grade student identified with ADHD (that is, a student identified under the IDEA category of Otherwise Health Impaired). Missy struggles with inattentiveness and disorganization. Missy's general education and special education teachers know that Missy pays better attention in class when she is receiving more stimulation. Her teachers are also aware that Missy needs supports to keep her organized and on task.
- Ty is a fifth-grade student identified with an emotional/behavioral disorder. Ty attends general education courses and also receives support from his special education teacher and a school social worker. Ty is working on monitoring his own behavior and determining not only when he is on task but also when he is making good choices with his behavior in terms of respecting others' spaces and focusing on positive peer interactions.
- Caleb is a second-grade student identified with autism spectrum disorder. In addition to Caleb's struggles with communication and social interaction, Caleb's parents have noted the benefits of sensory integration. In other words, Caleb's parents feel he benefits from engaging in activities that address his need for sensory input.

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Based on the brief case studies provided, what assistive technology would you consider evaluating for Missy, Ty, and Caleb? Please keep in mind that the technology should address the student's environments and tasks, and, of course, be something each student is willing to use.

options include planners or planning notebooks (e.g., students write in their assignments, and teachers sign the notebooks), color-coding work and folders, and using highlighters and sticky notes. Educators can also use picture or visual schedules for students who need visual reminders about their days (i.e., typically young children or students with autism spectrum disorder). Visual schedules are considered an evidence-based practice for students with autism spectrum disorder (Knight, Sartini, & Spriggs, 2015).

Mid-tech and high-tech assistive technology can also support the organizing, planning, and prioritizing skills of students with disabilities. For example, one mid-tech assistive technology to help with organization is audio recorders. With audio recorders, students, parents, or teachers repurpose the tool to record and provide prompts, cues, or reminders for later. Another technology that could be repurposed to support the organization and memory of students is a Livescribe smartpen. The Livescribe pen allows students to write notes on special paper while simultaneously recording audio. A student can then retrieve the audio that corresponds to what they recorded within their written notes. In addition to supporting students with taking class notes, students can also record their assignments for each class as well as record reminders for themselves throughout the day.

Rather than these stand-alone devices, students now may be more likely to access apps on smartphones or tablets to support organization in the same or similar manner. Common apps involve the standard reminder or calendar apps on smartphones and tablets included in the operating systems. In addition, teachers and parents can also take advantage of other apps to support students with planning, managing time, or organizing their in-school and out-of-school lives (see Table 7.1).

Table 7.1 Examples of Apps to Support Student Organization

App and OS	Information
iHomework (iOS) (For purchase)	• Keeps track of student's school work, assignments, and grades across iOS and OS X platforms • Provides reminders for out-of-school or nonschool activities • http://www.element84.com/ihomework/iOS.html
Evernote (Free)	• Allows users to type notes, including adding images as well as audio, and to sync these notes across different devices (e.g., computer, smartphone, tablet) • Allows sharing of notes • https://evernote.com/
inClass (iOS) (Free)	• Keeps track of classes and assignments • Allows students to take notes, including video or audio • http://www.inclassapp.com/

(Continued)

Table 7.1 (Continued)

App and OS	Information
Studious (Android) (Free)	• Creates a schedule and reminds students about assignments and tests • Allows notes to be created and stored • Turns phone to silent when in class automatically • https://www.studiousapp.com/
What's Today (iOS) (For purchase)	• Creates and maintains schedules for young children • Provides voice support • http://www.whatstodayapp.com/
Choiceworks (iOS) (For purchase)	• Creates visual schedules • Includes other boards for supporting feelings and waiting • http://www.beevisual.com/
WatchMinder™ (iOS) (For purchase)	• Provides reminders • An app version of the WatchMinder stand-alone device • http://www.watchminderapp.com/

Case Study 7.2 Recap: Missy

Missy's IEP team decided Missy should try a combination of assistive technology, at various levels of sophistication. To address her need for organization, Missy's IEP team decided to have Missy carry either her smartphone throughout the day and, at the end of each class or after an assignment is given, record the daily assignments as well as reminders of upcoming projects, quizzes, major assignments, or tests into the app inClass. (Note that if Missy had an Android device, her IEP team would recommend Studious.) In addition, her IEP team suggested that Missy use the app Voice Recorder, a free app that works on her iPhone, to record audio reminders for herself as well. Finally, Missy has worked with her special education teacher to color-code her class materials. Working with Missy's parents, Missy obtained five different colored notebooks and matching folders and binders, as necessary for the course.

Management and Monitoring

Classroom Management

One aspect of management is **classroom management**. Teachers can use technologies to manage, monitor, and evaluate individual-student or whole-class behaviors. Teachers may use low-tech means to address classroom management, such as using colors of paper to represent what level students are on (e.g., green is making good decisions and red is not making good decisions) or clips and a scale printed on a strip of paper to move students from one level to another. For individual students, teachers can also use paper and pencil means to record student behavior. However, it can be challenging to keep a piece of paper and pencil handy as one is teaching, and research suggests teachers tend to forget the longer it is between noting a behavior and recording (Taber-Doughty & Jasper, 2012).

Educators can use more sophisticated technology to monitor and evaluate student behavior, such as smartphones and tablets and their apps. One popular app to record and evaluate student behavior is Class Dojo (see https://www.classdojo.com/). Class Dojo allows teachers to record positive or negative behaviors throughout a school day for each student. Teachers can individually select what behaviors (e.g., responsible use of time or ready to learn) they are going to monitor and what they are going to call them. Class Dojo actually involves more than one app; there is an app for teachers to record behaviors on a mobile device (they can also record from the Internet on a computer) and an app for parents to monitor their student's behavior and check reports. Class Dojo has been used successfully by teachers with students in Grades K–12 and works with both iOS and Android devices. See Table 7.2 for examples of other apps to support classroom management.

Table 7.2 Examples of Apps to Support Classroom Management

App and OS	Information
TooNoisy (iOS & Android) (For purchase)	• Provides different graphics that measure noise in a classroom and provides visual signals (e.g., happy face) • http://toonoisyapp.com/
Classroom Carrots (iOS) (Free)	• Operates similar to Class Dojo but is geared toward younger children • Provides reinforcement and incentives to teachers for using the app • Allows teachers to record positive student behaviors • http://www.classroomcarrots.com/

(Continued)

Table 7.2 (Continued)

App and OS	Information
Stick Picks (iOS & Android) (For purchase)	• Allows teachers to randomly select a student • Enables teachers to store and share information • http://stickpickapp.blogspot.com/
Teacher Kit (iOS) (Free with in-app purchases)	• Allows teachers to record and evaluate students' attendance, behavior, and grades • Enables teachers to communicate with parents • http://www.teacherkit.net/
Kids Countdown (iOS) (Free)	• Provides visual and auditory support for time management for kids • https://itunes.apple.com/us/app/kids-countdown-visual-timer/id786114488?mt=8
Kids Timer (Android) (Free)	• Provides visual and auditory support for time management for kids • https://play.google.com/store/apps/details?id=nl.skywise.kidstimer&hl=en

Self-Management

In contrast to classroom management, in **self-management** students take responsibility for managing their behavior; the responsibility shifts from the teacher to the student (Briesch & Daniels, 2013). Self-management is an evidence-based practice for students with disabilities (Carr, Moore, & Anderson, 2014; Maggin, Briesch, & Chafouleas, 2013). Self-management is typically thought to include such areas as self-monitoring, self-recording, self-evaluation, self-reinforcement, and goal setting (Epstein, Mooney, Reid, Ryan, & Uhing, 2005).

Self-Monitoring. Self-monitoring is probably the most common or well-known aspect of self-management (Briesch & Daniels, 2013). **Self-monitoring** is defined as identifying and regulating one's behavior and represents a common intervention for addressing certain behavior. With self-monitoring, students are taught to identify a behavior and then adjust it through continual identification and recording (Ackerman & Sharipo, 1984; Agran, 1997; Rafferty & Raimondi, 2009). Self-monitoring typically involves two approaches: self-monitoring of performance and self-monitoring of attention (Reid, Trout, & Schartz, 2005). Self-monitoring of performance involves students monitoring their academic

Perspective 7.1

Policy to Practice

Class Dojo is a relatively new tool, and not a lot of research exists to date regarding its use in inclusive or special education classes. However, Class Dojo does provide a means to help educators collect and analyze data relative to the implantation of positive behavior intervention and supports (PBIS) in schools (O'Brien & Aguinaga, 2014; Sugai et al., 2000). The use of PBIS in schools is a practice supported by policy as well as research (Gable, Tonelson, Sheth, Wilson, & Park, 2012; Technical Assistance Center on Positive and Behavioral Interventions and Supports, n.d.).

Case Study 7.3

Mr. Keusch is a first-grade teacher. He uses Class Dojo in his classroom to monitor his students' behavior and as part of the data collection system for his school's Multi-Tiered System of Supports (MTSS). Prior to school starting, Mr. Keusch sent home a note to parents explaining Class Dojo—how to sign up their students and how to create their parent accounts. Mr. Keusch also examined his choice of behaviors to monitor, both the positives (e.g., responsible use of time) and the ones that indicated students had work to do (e.g., blurting out). Mr. Keusch told the parents that his goal for each of the students was 80% positive across a day and week, but 90% was a worthy goal for each

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child. In class, Mr. Keusch carries his tablet and notes the behavior of his students. He does not record each positive behavior but uses them intermittently. With Class Dojo, each student can create their own avatar, and he projects the avatars on his class SMART Board at different times throughout the day. Students can see the positive behaviors they have earned

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(i.e., the avatars have green positive numbers for ones earned), but they cannot see any indications that they need work. He speaks with students individually about behaviors that need improvement. Mrs. Click's son Troy is in Mr. Keusch's class. She can check daily as well as weekly on Troy's behavior. At home, she reinforces the positive behaviors that were noted (e.g., on task or responsible choices) and discusses any behaviors that were noted by the teacher as needing improvement (e.g., unprepared, off task, or disrespectful). Mrs. Click found that Troy likes to get on the app to check his report every night and engage in conversations about the day based on the report. Troy expresses feelings of pride when he receives responsible choices or responsible use of time. They also discuss any red or "needs work" behaviors (e.g., blurting out) that occur, how everyone is going to get some, and that a few are acceptable.

performance, such as in terms of productivity or accuracy (Reid, 1996). Self-monitoring for attention involves monitoring attention-based behavior (e.g., being on task).

There are two ways in which assistive technology can support self-monitoring. One way is to provide the cue to monitor one's behavior or performance (e.g., an audio tone versus a teacher's hand signal), and the other is to serve as the means of recording one's monitoring (e.g., paper and pencil versus a student response system). In terms of recording, the most common means is the low-tech option of paper and pencil. With paper and pencil, students can record or monitor their behavior, such as being on task for attention monitoring or correctly answering problems for performance monitoring (see Figure 7.1).

Students can also record their performance (i.e., task completion as well as accuracy) with paper-and-pencil self-monitoring. For example, students who are engaged in completing a series of tasks, such as cooking, can use a self-monitoring checklist to indicate they completed each step (see Figure 7.2).

Of course, both types of self-monitoring can also occur via more sophisticated technology. For example, students can self-monitor their behavior or performance via apps on a smartphone or tablet (e.g., Upad, TickTick, Remember the Milk, Do It [Tomorrow], and Wunderlist). Note, many of these apps suggested are not designed for education. However, the apps can be

Figure 7.1 Sample Self-Monitoring for On-Task Behavior with Paper and Pencil

On-Task Behavior	Off-Task Behavior
• Hands used appropriately • Sitting in chair • Materials placed in correct area • Eyes on teacher	• Getting out of seat • Disruptive talking, including shouting out responses, talking to classmates, or talking to self

Please check Y (YES) or N (NO) for each question each time when given the signal by your teacher:

	Am I following class expectations?	Am I completing my assignments?
Time 1		
Time 2		
Time 3		
Time 4		
Time 5		

repurposed from tools to support individuals in everyday life with productivity and staying organized to tools to support students with disabilities with self-monitoring their performance or task completion at school (Bouck, Shurr, Tom, Jasper, Bassette, Miller, & Flanagan, 2012; Mishra & Koehler, 2009).

Educators can also repurpose educational technology for students to self-monitor. Szwed and Bouck (2013) successfully taught three elementary students to self-monitor their on-task behavior using student response systems (i.e., Clickers). The teacher already used the same student response systems in her classroom so the students having them at their desks and using them to self-monitor did not draw attention or create any stigmatization. The teacher signaled the students subtly with her hand, and they used their clickers to respond to the prompts on whether they were meeting class expectations and if they were completing their assignments.

While a hand signal can be a common way for teachers to signal to students to self-monitor, whether with paper and pencil or with technology, students can also receive signals via technology. Signals can also be transmitted visually through low-tech means, such as a sign or symbol. A mid-tech means of

Figure 7.2 Sample Self-Monitoring for Task Completion or Performance with Paper and Pencil

Brushing Teeth	
4. Open toothpaste 	☐
5. Put toothpaste on toothbrush 	☐
6. Turn on water 	☐
7. Get toothbrush wet 	☐

providing a prompt to self-monitor is an audio signal (e.g., beep, tone, or voice), which can be transmitted through technology (e.g., recorders) (McDougall, Morrison, & Awana, 2011).

Educators and researchers have also explored using tactile prompts, which allow students to feel the prompts or cues to self-monitor. One such example of a tool to provide tactile prompts is the MotivAider® (see Figure 7.3). The MotivAider® is a small beeper-like device that vibrates. Note, one can also obtain MotivAider as an app for iOS and Android devices. In another example, Bedesem and

Figure 7.3 The MotivAider®

Source: Behavioral Dynamics. Reproduced with permission.

Dieker (2014) recommended a cell phone to both provide cues to students to self-monitor their behavior as well as to record their behavior. Through texting and using the vibrate mode on a cell phone, a student can receive cues to self-monitor his or her behavior as well as respond if he or she is on task.

Another specifically designed product to deliver prompts and reminders is the WatchMinder® (see http://watchminder.com/). WatchMinder is a programmable sports watch that can set 30 alarms (e.g., study for test or take medication) as well as 65 preprogrammed messages (see Figure 7.4). The WatchMinder is also available in app form (see http://www.watchminderapp.com/), which provides messages at random or set times throughout the day. In addition to providing prompts or cues for students (e.g., relax), students can also use the app to self-monitor their behavior, as this app provides the cues as well as serves as a means of self-monitoring.

Self-Operated Prompting Systems. A type of technology that acts as a self-management strategy is **self-operated prompting systems** (Mechling, 2007). Self-operated prompting systems offer students antecedent cues that support them in engaging in particular behaviors or completing a task; self-operated prompting systems can support students in terms of self-instruction (Ayres, Mechling, & Sansosti, 2013; Taber-Doughty, 2005; Savage, 2014). Self-operated prompting systems include picture, audio, and video modeling or prompting. (Note that video modeling involves a student watching the entire video before performing the tasks, whereas video prompting involves a student

Perspective 7.2

Research to Practice

Research exists supporting the use of the MotivAider in prompting students to self-monitor their behavior or performance. Moore, Anderson, Glassenbury, Lang, and Didden (2013) found that three middle school–aged students in the general education classroom improved their on-task behavior following self-monitoring of their behavior; they were cued to self-monitor by the MotivAider that vibrated every three minutes. McDougall et al. (2011) found use of the MotivAider improved student performance with secondary students with ADHD or emotional/behavioral disorder when used to self-monitor if they were completing their classwork. Most recently, Briesch and Daniels (2013) found use of the MotivAider to prompt self-monitoring improved the on-task behavior of three middle school students with behavioral challenges.

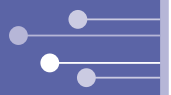
Figure 7.4 WatchMinder

Source: Laurence D. Becker, PhD, child psychologist and inventor of the WatchMinder. Reproduced with permission.

watching each step of a task and then subsequently performing that step repeatedly until the entire task is completed [Ayres et al., 2013].)

Technology for picture prompts includes low-tech pictures, such as photographs, icons, or drawings. Picture prompts can help cue students, for example, to identify and correctly locate grocery items or complete a vocational

Case Study 7.4 Recap: Ty



At his case conference meeting, Ty's IEP team decided to implement self-monitoring. While the IEP team decided to try paper-and-pencil self-monitoring, they also decided to use technology to cue Ty to self-monitor if he is on task and doing what is expected of him in each class. Although the IEP team considered repurposing Ty's iTouch to provide the cues, they worried the technology might be distracting or raise attention since Ty's school does not allow students to use their MP3 players in class. As a result, they decided to have Ty try the WatchMinder to cue him to self-monitor his behavior. Ty's parents also liked that the WatchMinder was a technology that looked like a typical watch and would not attract the attention of peers and potentially create more stigmatization for Ty. Ty keeps his self-monitoring sheets in his class notebooks for ease of recording. In addition to Ty monitoring his own behavior, his parents also asked for increased communication and data on Ty's IEP goals of positive peer interactions and respecting others' space. The IEP team decided to have Ty's general education and special education teachers use Class Dojo in class, as they could record data on their own smartphones or tablets, and Ty's parents could receive daily reports.

task. A range of mid-tech options can deliver audio prompts. The technologies to deliver audio prompts have advanced over the years, moving from tape recorders to CD Walkmans to audio recorders and MP3 players or smartphones. Video modeling or video prompting can be delivered via a desktop, laptop, tablet, or even smartphone; more commonly now, we see video-based self-operated prompting systems delivered via portable or handheld technology (Ayres et al., 2013).

Prompting systems are used to support students with disabilities in a variety of areas, including academics, communication, employment or vocational skills, leisure, transitioning, and social skills (Cihak, Fahrenkrog, Ayres, & Smith, 2010; Kagohara et al., 2013; Kaghoara, Sigafoos, Achmadi, O'Reilly, & Lancioni, 2012; Mechling, 2007; Reed, Hyman, & Hirst, 2011). While not exclusively, much of the attention on self-operated prompting systems occurs for students with intellectual disability or students with autism spectrum disorder.

Perspective 7.3

Do It Yourself . . .

Teachers can create their own self-operated prompting systems, including picture prompting, audio prompting, or video prompting (or video modeling). While Table 7.3 provides an overview for developing a self-operated picture, audio, or video system, more detailed information about how to construct audio and video self-operated prompting system exists in recent articles in *TEACHING Exceptional Children* (see Savage, 2014; Weng, Savage, & Bouck, 2014). These articles provide extensive information about how to create self-operated prompting systems, including discussions about what technology to use and step-by-step instructions.

Table 7.3 Steps for Developing a Self-Operated Picture, Auditory, and Video System

Self-Operated Picture Prompting System	Self-Operated Auditory Prompting System	Self-Operated Video System
1. Identify target task.		
2. Develop a task analysis.		
3. Determine the types of pictures to use (drawings, photos, or icons [e.g., Boardmaker by Mayer-Johnson]).	3. Determine the "script" of auditory prompts.	3. Determine if the student will use video prompting or video modeling
4. Identify words (if any) that will accompany pictures.	4. Determine who will be the "voice" on the audio system (student, teacher, favorite paraeducator, or parent) or whether a "tone" will be used to prompt the student to the next step.	4. Decide video point of view. (Will it be from the student's perspective? Will it depict the student or a different known or unknown individual engaged in the task?)
5. Identify how pictures will be presented (e.g., communication notebook, paper, or an electronic system such as a tablet or smartphone).	5. Determine the system for delivering auditory prompts (e.g., audio recorder, tablet, smartphones, or MP3 player). Also, determine if headphones are needed.	5. Identify the system for delivering videos (e.g., DVD player, computer, tablet, or smartphone).
6. Develop prompting system, and ask two novel individuals to complete the task using the self-operated system. Make edits based on individuals' performances.		
7. Determine if students will use self-management skills when using the self-operated system. Will students self-monitor their progress using a checklist? Will they engage in self-evaluation?		
8. Evaluate student performance as he or she uses the self-operated system.		

Source: Adapted from *Footsteps Toward the Future: Implementing a Real-World Curriculum for Students With Disabilities*, by E. C. Bouck, T. Taber-Doughty, and M. N. Savage, 2015, p. 35. Copyright 2015 by Council for Exceptional Children.

Social Skills and Social Emotional Development

Social Skills

Another component to behavior is **social skills**, which are skills that help individuals make appropriate decisions in various situations. In other words, when one has good social skills, one understands how to interact with others (e.g., verbal and nonverbal communication) and, generally, how to make good decisions that are appropriate. However, some students struggle to learn as well as display consistent, positive social skills, for example, initiating conversations and responding to others, appropriate play skills, social conventions, and regulating emotions (Reed et al., 2011). Educators, including teachers and school social workers, among others, provide interventions to teach and support social skills. One avenue to consider is how assistive technology can support the development of social skills.

Two mechanisms already discussed in this chapter in which technology can support the learning and displaying of positive social skills are self-monitoring and self-management (such as self-operated prompting systems). In fact, Otero, Schatz, Merrill, and Bellini (2015) suggested video modeling was one of the most fruitful interventions for teaching social skills to students with autism spectrum disorders. Teachers and educators can create their own self-operated prompting systems for social skills, such as video models or video prompts; however, a few commercially available options also exist. For example, Model Me Kids® created videos that model social skills for students (see http://www.modelmekids.com/autism-behavior.html).

Other technology can also support the teaching or development of social skills. For students with autism spectrum disorder, a common low-tech form of assistive technology is social stories or social narratives (Gray & Garand, 1993). A social story is a story written with images (i.e., icons or pictures) in the first-person point of view that targets a social skill. When using social stories, educators and students read them together. The student might then be asked comprehension questions or asked to role-play the skill discussed (Kassardjian et al., 2014). In addition to paper-and-pencil social narratives and stories, educators can also use more sophisticated technology. For example, Ben-Avie, Newton, and Reichow (2014) indicated teachers were able to use the app StoryMaker™ for Social Studies (available from Handhold Adaptive for purchase) to develop and use social narratives for students with autism spectrum disorders. Other app options, such as I Create . . . Social Skills Stories (available from I Get It for purchase) and Stories About Me (available from Limited Cue for purchase), also exist.

More sophisticated or high-tech assistive technologies also exist to support students with developing social skills. For students with autism spectrum disorder, virtual environments or virtual reality are explored as avenues to teach and promote appropriate interactions (Boucenna et al., 2014; Newbutt, 2014). For example, Cheng and Ye (2010) found students with autism spectrum disorder who interacted in a collaborative virtual learning environment experienced increases in positive social interactions and behavior. Similarly, Cheng, Chiang, Ye, and Cheng (2010) found individuals with autism spectrum disorder increased their capabilities to recognize empathy in others through interaction in a 3D virtual environment.

Robots are another type of technology increasingly examined to support students with autism spectrum disorder (Senland, 2014). Robots have been used to support students with autism spectrum disorder in developing social skills, understanding emotional expressions, and improving social interaction (Feil-Seifer & Matarić, 2011; Scassellati, Admoni, & Matarić, 2012; Tapus et al., 2012). One such example of a robot marketed to work with students with autism spectrum disorder is NAO by Aldebaran (see https://asknao.aldebaran.com/). NAO is considered a humanoid robot and works with apps or games to support students. Research by Tapus et al. (2012) found individual differences among the four young children with autism spectrum disorders in terms of interacting with NAO, ranging from no social interaction impact to increased eye gaze and motor imitation. Other researchers examining NAO, including Bekele et al. (2013), found students with autism spectrum disorder preferred to look at the robot as compared to a human. Diehl et al. (2013) found students with autism spectrum disorders experienced greater improvement in terms of social behaviors with applied behavior analysis when using NAO than without.

Socioemotional Development

Socioemotional or **social emotional development** in children can also be developed and supported through assistive technology. Apps that support the socioemotional development focus on recognizing and understanding emotions in children, particularly those that struggle or have special needs. These include, for example, Touch and Learn – Emotions (available from Innovative Mobile Apps for free) and Social Emotional Exchange (SEE; available from saym basheer for purchase). Another option for technology for socioemotional development, although without a substantial research base, is the use of robotic animals. In place of live animals, students interact with robotic animals, which are tools

Perspective 7.4

Expanding Our Considerations

While the section on social skills and assistive technology tended to focus heavily on students with autism spectrum disorders, they are not the only students who struggle with social skills. Students with and without disabilities alike can struggle with social skills. In Table 7.4, additional technology resources to support positive social skills are presented.

Table 7.4 Examples of Technology to Support Positive Social Skills

App or Web 2.0 Resource	Information
Arthur's Big App (iOS & Android) (For purchase)	• Produced by PBS • Provides games that support positive social skills • http://pbskids.org/apps/filter/app/
What Would You Do at School If . . . Fun Deck (iOS) (For purchase)	• Created by Super Duper Publications • Provides visual and audio flash cards that present a scenario (e.g., you see a classmate cheating) and asks students what they would do
The Social Express (Web 2.0) (For purchase)	• Presents students with animated social problems to solve

designed to look and feel like real animals (Bouck et al., 2012; Stanton, Kahn, Severson, Ruckert, & Gill, 2008).

Sensory

Students with a range of disabilities or challenges can benefit from sensory input, including, but not limited to, students with emotional-behavior disorders, ADHD, and autism spectrum disorders. Sensory input is often used with children with sensory processing disorder, although this is not a category or classification under IDEA. Sensory-based therapies involve providing students with sensory input or sensory stimuli, including, but not limited to, sensory rooms. Often, the forms of sensory stimuli involve low-tech assistive technology, such as sitting on a therapy or exercise ball, holding Silly Putty, and wearing weighted vests or blankets (Lang et al., 2012).

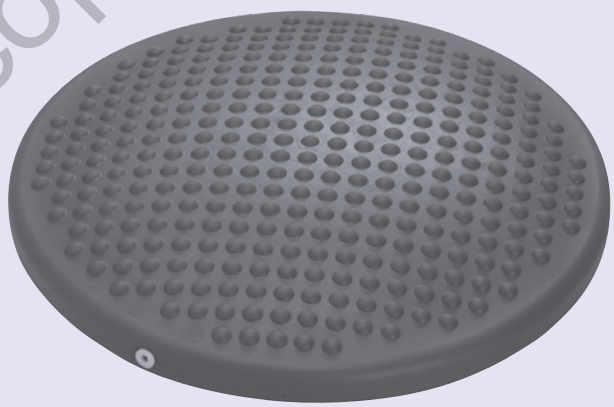
Perspective 7.5

Additional Information

Sensory processing disorder (SPD) is not a disability covered under IDEA. In fact, the American Academy of Pediatrics developed a policy statement against the diagnosis of sensory processing disorder citing a lack of accepted diagnosis framework and the failure of the field to understand if this represented an actual disorder or if the sensory challenges were characteristics of other disorders, such as behavior disorders, autism spectrum disorder, or other developmental disabilities (Zimmer & Desch, 2012). Those that advocate for sensory processing disorder refer to it as a condition in which an individual does not make appropriate responses to sensory signals; in other words, a child has trouble processing sensory stimuli or information (for example, tactile, visual, or auditory) (SPD Foundation, n.d.).

Low-tech sensory-based assistive technology options can include options for seating or positioning. For example, some students use therapy or exercise balls in place of traditional chairs for sitting at one's desk. Other students may use a specific type of seat cushion, including ones that are filled with air, beads, beans, and foam (see Figure 7.5). Of course, in contrast to purchasing or making any supportive seating or positioning assistive technology, teachers can allow students to stand at their desks. Standing can occur at a traditional desk or with adjustable height desks. Please see Chapter 4 for additional discussions regarding seating and positioning for students with disabilities.

Figure 7.5 Cushion for Seating



Source: Toymarketing International, Inc.

Perspective 7.6

Theory to Practice

Low-tech assistive technologies like seat cushions, Silly Putty, or Koosh balls might benefit students with ADHD, based on the optimal stimulation theory as proposed by Zentall (1975, 2005). With optimal stimulation theory, Zentall proposed that students with ADHD need more stimulation rather than less. Hence, students with ADHD should not be removed from potential distractions but provided greater stimulation through sensory input (e.g., color and music) (Zentall & Zentall, 1983). For practice, this means that the additional stimulation students with ADHD receive from touching Silly Putty or Koosh balls, sitting on a seat cushion, or doodling benefits students; these interactions are not distractions.

Aside from seat cushions or therapy balls to provide stimulation for seating and positioning, other low-tech sensory-based assistive technology includes handheld objects, sometimes referred to as fidget toys. These handheld objects, or fidget toys, include options that are specifically marketed to provide sensory stimulation (e.g., theraputty or textured or hairy tangles) or that are everyday toys repurposed to serve as assistive technology. Such repurposed objects can include Silly Putty, Koosh balls, or kinetic sand. Similarly, doodling can be used to help students pay attention and focus. Research with adults suggested an individual's concentration and memory improved when doodling (Andrade, 2010). There is also a doodle revolution (see http://sunnibrown.com/doodlerevolution/) to change perception that doodling is a distraction rather than helping individuals focus.

Sensory-based assistive technologies also address areas of **sensory integration**. Sensory integration refers to "the neurological process that organizes sensation from one's body and from the environment and makes it possible to use the body effectively within the environment" (Ayres, 1972, p. 11). Sensory integration is connected to sensory processing disorder. A key proponent of sensory integration, or sensory integration intervention (i.e., Ayres Sensory Integration®), was Ayres, an occupational therapist (May-Benson & Schaaf, 2015). Within sensory integration, such low-tech assistive technology as weighted vests or weighted lap blankets may be used. Some students may even use repurposed wraparound weights to provide the stimulation. In addition, squeeze balls, tactile rings, tactile blankets, vibrating pillows, or therapressure brushes may also be used. Sensory integration can also involve wave or bubble panels or swings. Often students with autism spectrum disorder, students with sensory integration disorder, or students with behavioral challenges use sensory-based assistive technology.

Perspective 7.7

Research to Practice

Despite the commonality of sensory integration therapy, sensory stimuli, or sensory rooms for students with autism spectrum disorders (Zimmer & Desch, 2012), the research is mixed at best and, more aptly, unsupportive of these approaches. For example, in a review of research on sensory integration therapy for students with autism spectrum disorder, Lang et al. (2012) found sensory integration therapy effective in only three of the 25 studies reviewed. In contrast, 14 reported no benefits were obtained for students, and eight suggested mixed findings. Another study that systematically reviewed the literature on sensory-based therapies for young children (i.e., under age 9) with behavior or developmental disabilities also concluded that there was a lack of research to support the benefits of sensory-based interventions (Barton, Reichow, Schnitz, Smith, & Sherlock, 2015). Lastly, in a meta-analysis of research on sensory integration therapy, Leong, Carter, and Stephenson (2014) concluded the evidence for use of such intervention was weak for individuals with disabilities. We are discussing sensory-based assistive technology in this text because, as suggested by Barton and colleagues, they are likely to continue to be used in schools and requested by parents.

Case Study 7.5 Recap: Caleb

Although Caleb's parents feel he benefits from sensory integration, the educators who work with Caleb are more reserved given the lack of research supporting the practice in terms of benefits. However, in the IEP meeting, it is agreed upon that the occupational therapist working with Caleb will work with Caleb's teachers to implement some sensory-based technologies in his classrooms. For example, they agree to allow Caleb to sit on either a therapy ball or a seat cushion in a traditional chair. They also agree that Caleb can keep a fidget toy with him as long as it does not become something that distracts him from what is occurring in class. His parents suggested Silly Putty or small Koosh balls, which worked well at home and in other out-of-school situations.

Web 2.0 Resources and Apps

The Web 2.0 resources and apps discussed in this chapter have largely focused on apps students can use to self-monitor or organize themselves. However, apps also exist for teachers to monitor student behavior or IEP goals (see Table 7.5 for examples of apps teachers can use to monitor student behavior).

Educators can also use technology to help students collectively manage time in school. While a traditional digital or analog clock might work, teachers can also use apps to support students in understanding how much time they have to work on an activity. For example, the iOS device Kids Countdown (free) provides a visual countdown clock for young children. For a similar app for Android devices, educators can elect to use Kids Timer (free). For those educators without a mobile device, they can explore different types of online stopwatches (http://www.online-stopwatch.com/classroom-timers/). Educators can set up the apps or website on their personal computer or mobile device or broadcast it visually for the whole class via an LCD projector or **SMART Board** (i.e., interactive whiteboard).

Table 7.5 Examples of Apps and Web 2.0 for Teachers to Monitor Student Behavior or IEP Goals

Technology	Information
	Apps
Percentally (iOS) (For purchase)	• Allows educators to track a student's goals and organize data • Also records time per each session • http://expressive-solutions.com/percentally/
Tracknshare (iOS) (Lite version is free) (For purchase)	• Allows educators to track whatever data they might want to monitor for a student • Allows data to be graphed and shared • http://www.trackandshareapps.com/
IEPPal (iOS) (Free app but requires subscription)	• Collects and charts data on students' IEP goals and/or objectives • Turns data into reports and graphs • http://www.ieppal.com/

(Continued)

Table 7.5 (Continued)

Web 2.0 Resources	
Google Docs (Free)	• Allows educators to create forms that collect information and data • Produces databases of data and graphs • Can be shared with other educators or parents • https://docs.google.com/

Concluding Considerations

Assistive technology to support behavior and organization, both broadly defined, ranges from low tech to high tech and includes emerging (e.g., robots) as well as research-supported (e.g., paper-and-pencil self-monitoring) options. Technology can support students with disabilities in terms of organization, social skills, and self-management, inclusive of self-monitoring. All students can occasionally struggle with social skills, paying attention, staying on task, staying organized, and regulating one's emotions or making good choices. Technology can support these students as well as students with disabilities who continually struggle with these areas, inclusive, but not limited to, students with autism spectrum disorders, emotional/behavior disorders, ADHD, and learning disabilities.

KEY TERMS

classroom management, p. 155
self-management, p. 156
self-monitoring, p. 156
self-operated prompting systems, p. 161
sensory integration, p. 169
SMART board, p. 172
social emotional development, p. 166
social skills, p. 165

EXTENSION ACTIVITIES

- Show the Sunni Brown TED Talk (http://www.ted.com/talks/sunni_brown) in class or have students watch individually. What message do you take away from this TED Talk with respect to doodling in K–12 classes? Should doodling be allowed, encouraged, or discouraged? If it should be allowed or encouraged, when?
- Show examples of video modeling (see https://www.youtube.com/watch?v=makIgB4X3q8 and https://www.youtube.com/

watch?v=3zYVR5PDom8) from Spectrum Keys in class or have students watch individually. Discuss how video modeling might, as in the given examples, support students with disabilities. Also, consider how teachers might develop or use picture or audio prompting in these situations in place of video.

- Show a video from AldebaranRobotics about the NAO robot on the *Engadget Show* (https://www.youtube.com/watch?v=oiURYf_og8M) in class or have students watch individually. Based on your understanding of NAO robots, how do you think the NAO can support and help students with disabilities? If you want to consider examples from the company of how NAO can support students with disabilities, please see the "Ask NAO: Be Part of the Journey" video (see https://www.youtube.com/watch?v=_AxErdP0YI8).
- Show "Assistive Technology in Action—Meet Jean" (http://bit.ly/1HXOU1U) in class or have students watch individually. Engage in a discussion regarding how an iPad serves as an instructional support for Jean.

APPLICATION ACTIVITIES

- Read (a) Savage, M. N. (2014). Self-operated auditory prompting systems: Creating and using them to support students with disabilities. *TEACHING Exceptional Children*, *47*(1), 266–275. doi:10.1177/0040059914542763, and/or (b) Weng, P.-L., Savage, M. N., & Bouck, E. C. (2014). iDIY: Video-based instruction using iPads. *TEACHING Exceptional Children*, *47*(1), 231–239. doi:10.1177/0040059914542764. Based on the information in the articles, develop your own audio- or video-based self-operated prompting system.
- Discuss the pros and cons to using picture-, audio-, and video-based self-operating prompting systems. Also, consider when and where you might use the different systems and what factors might influence your decision.
- Explore the different apps discussed in Chapter 7 (see Tables 7.1, 7.2, 7.4, and 7.5 as well as Class Dojo). Consider how the apps might help you as a teacher, you as a student, or the future students you will educate and support.

DISCUSSION QUESTIONS

1. How can technology support students with self-monitoring their behavior?
2. What low-tech and high-tech options can help teachers to address classroom management or monitor IEP goals relative to behavior?
3. What sensory-based assistive technology is used with students with disabilities?
4. How can technology support students with disabilities to be more organized?

RESOURCES/ADDITIONAL INFORMATION

- The IRIS Center provides modules on behavior and classroom management. See Classroom Management Part 1 (http://iris.peabody.vanderbilt.edu/module/beh1/) and Classroom Management Part 2 (http://iris.peabody.vanderbilt.edu/module/beh2/#content)
- The Council for Children with Behavioral Disorders of the Council for Exceptional Children (http://www.ccbd.net/home)
- The Division on Autism and Developmental Disabilities of the Council for Exceptional Children (http://daddcec.org/)

SUGGESTED ENRICHMENT READINGS

- Myles, B. S., & Rogers, J. (2014). Addressing executive function using assistive technology to increase access to the 21st century skills. In N. R. Silton (Ed.), *Innovative technologies to benefit children on the autism spectrum* (pp. 20–34). Hershey, PA: IGI Global.
- Temple, C. (2013). Executive function skills and assistive technology. *Perspectives on Language and Literacy*, *39*(4), 15–17.