Building Independence through Self-Prompting with Technology

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Abstract

Self-management is an effective, well-researched set of strategies for increasing, decreasing, and maintaining one's own behavior. Self-management strategies have been shown to be effective in supporting students with disabilities, with the ultimate outcome of greater independence. Self-prompting, an important step in self-management, has become even easier to learn and implement with currently-available technology. This paper discusses the benefits of self-prompting and how technology may be used to teach and improve self-prompting repertoires, and offers several suggestions for applications to facilitate self-prompting.

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Independence can be one of the ultimate goals for any student with special needs, but research shows that many adults with disabilities are dependent on others for a variety of needs (Billstedt, Gillberg, & Gillberg, 2005; Roux et al., 2015). Consequently, educational programs should be careful not to neglect to specifically address independence as a characteristic of learned skills. For the purposes of the current discussion, independence is defined as when the individual is not only able to, but does, initiate and carry out a task or action without assistance from another person. For example, educators certainly want students with special needs to independently indicate when they need to use the bathroom independently, without being asked or prompted. They should also be able to independently complete the bathroom routine, without the presence of a parent, teacher, or other support person. This level of independence is important because it is associated with greater personal freedoms, maximized personal outcomes, individual dignity, and reduced dependence on others. When an individual with a disability is dependent on others for basic daily needs, his or her options may be very limited (Billstedt, et al, 2005).

There are situations in which dependence on others may not be a bad thing. When one is in need of a physician, most don't choose to perform our own medical interventions. Instead, most would rely on medical professionals for those needs. Even in this example, though, independence is desirable at many levels to get to the point of having that medical intervention performed: choosing the doctor, making an appointment, discussing the options, conducting independent research, and ultimately making the final choice and following through on it, are all necessarily independent behaviors. For people with and without disabilities, a reasonable dependence on others is not a problem, but partial, if not complete, independence in most areas is an important goal (Billstedt et al., 2005).

Life skill independence is particularly problematic for many individuals with autism spectrum disorder (ASD). As students approach and enter adulthood, life skills become a possible gauge of independence (e.g., Billstedt et al., 2005; Newman et al., 2010; Roux et al., 2015). ASD has a

lifelong impact on all areas of functioning where specific challenges related to ASD, including social and language deficits, can lead to increased vulnerability in adulthood. People with ASD may also have particular difficulty in making and executing personal decisions. These challenges are compounded by the drastic reduction in supports and services available when transitioning to adulthood from the protections of the educational system (Friedman, Warfield, & Parish, 2013). Lack of federal mandates/funding and varied rules and implementation of services can lead to a nightmare sometimes referred to as "stepping off a [services] cliff" (Roux et al., 2015, p. 8). Ultimately, the primary concern for individuals with ASD may become the transition to adulthood where independence may be lacking in many areas; both due to – and compounding – the challenges that they already face due to their disability.

When behavioral repertoires are lacking, one may look in one of two directions. First, one may need to determine if the skill set is missing. If so, this can be addressed through instructional strategies. If an individual does not know how to cook for himself, steps can be taught in the cooking process. A question may arise, however: What if that individual has learned to cook, but simply doesn't do it? One possibility is that the prompts to cook are absent. The person may not have learned to cook completely independently, and is waiting for someone to tell him what to do. Prompts to cook are not problematic in and of themselves; most of us use prompts when we cook, but we call them recipes and we manage them independently. Prompts that depend on other people can be problematic, however. In the case of the person who knows how to cook and wants to cook but doesn't cook because no one is telling him how, we have a chance to facilitate independence by adding those prompts that are not related to or dependent on the presence of other people.

Research suggests that dependence on prompts provided by other people may occur due to the ways prompts are used to initially teach skills. Least-to-most prompting is the strategy most commonly used by special educators (Repp, Karsh, & Lenz, 1990). Least-to-most prompting is done by providing the least intrusive prompt possible, and gradually increasing through a hierarchy of intrusiveness until an effective prompt is found. According to Fisher, Kodak, and Moore (2007), least-to-most prompting is most likely to cause prompt-dependence, however. An alternative to least-to-most prompting is most-to-least prompting, which starts with the most intrusive prompt likely to result in the desired behavior, and then gradually reducing or fading the intrusiveness of the prompt over time. Both of these strategies rely on other people, however, as do other suggested ways to reduce prompt-dependence: teaching an observing response (Fisher et al., 2007), and differentially reinforcing independence (Hausman, Ingvarsson, & Kahng, 2014; Karsten & Carr, 2009).

An alternative to learning not to rely on prompts provided by others to learn to self-manage one's own prompts, which never need to be faded or removed (Savage, 2014), and which free up teachers and support staff from needing to deliver prompts (Shulze, 2016). Self-management is a set of operant strategies that may be controlled by an individual to support his or her own behavior (Carr, Moore, & Anderson, 2014). Self-management has been shown to lead to independence across social, work, and academic areas for individuals with a variety of challenges (e.g., Nelson, Smith, Young, & Dodd, 1991; Hume, Loftin, & Lantz, 2009; Daly & Ranalli, 2003; Patton, Jolivette, & Ramsey, 2006; Rafferty, 2010), and is considered an important early step in the development of a self-determination repertoire (Clouse & Bauer,

2016). Much of the research on self-management focuses on teaching the skills of self-monitoring, self-prompting, and self-reinforcement, and the resulting effects of learning these skills on independence in various areas. For example, adolescents in a self-contained class learned to self-manage on-task and socially appropriate behavior (Ninness, Fuerst, Rutherford, & Glenn, 1991). Teens with ASD used self-management to learn to follow schedules (Newman, et al., 1995) and engage in appropriate conversation (Newman, Buffington, & Hemmes, 1996). Children with ASD reduced problem behavior by self-managing a DRO schedule of reinforcement, in which reinforcement was self-delivered for periods of time when problem behavior did not occur (Newman, Ryan, Tuntigian, & Reinecke, 1997). Self-management has also been shown to be useful in supporting adults with disabilities. For example, Christian and Poling (1997) showed how two women with developmental disabilities learned to self-manage vocational tasks, which improved speed when working.

Despite the very frequent use of self-prompting as a strategy of self-management, the author found fewer self-prompting studies than those focused on self-monitoring and self-reinforcement. Self-prompts described in the literature take varied forms, including auditory, visual, and tactile cues. McDougall and Brady (1995) taught students to use tape-recorded cues to self-prompt self-assessment of study behavior. In the DRO study conducted by Newman and colleagues (1997), a kitchen timer was used to signal one-minute intervals for students to self-deliver reinforcement for the absence of behavior. Timers were used to set criteria for self-reinforcement for work completion in the study of self-management of vocational tasks conducted by Christian and Poling (1997). Visual cues have also been used to self-prompt, such as when pictures were used as transition cues to improve job independence (Sowers, Verdi, Bourbeau, & Sheehan, 1985).

Audio and visual cues have been demonstrated to be helpful in self-prompting, but there are drawbacks associated with each. Audio cues may be disruptive to others around the individual. For example, one could imagine a quiet classroom punctuated by a beeping or ringing timer at regular intervals. That timer might be helpful in keeping a student with ASD or another disability on-task without intervention from an adult, but it might also result in distraction and off-task behavior for that student's classmates. Visual cues are quiet and not likely to impact others, but they can be time-consuming to prepare and maintain, and may lose saliency (and effectiveness) over time. Both audio and visual cues are noticeable and may be stigmatizing in less-restrictive environments.

Fortunately, there are now choices of different ways to self-prompt. Some find that low-tech visual cues are beneficial, and many people with and without disabilities rely on prompts like written calendars and to-do lists, but there are now digitized alternatives that are easier to create, manage, store, and that may be much more appealing to the people who need to use them.

Similarly, for audio prompts, teachers can use the lower-tech strategies like recorded beeps and timers, but these are even easier and more discreet to implement with smart phones and other consumer devices. For example, a student wearing a Bluetooth headset might be prompted from a distance in community or job situations. Even just setting a regular alarm to remind oneself to do something or to self-monitor is pretty standard using the currently available consumer technology. While it might be odd to see someone self-prompting with a kitchen timer in a

classroom or work environment, it's perfectly natural to hear a smart phone chime quietly in one of those settings. Even better, smart phones can be set to deliver tactile prompts, which are virtually unnoticeable to anyone except the person who is receiving the prompt.

With the introduction of the MotivAider© 25 years ago, research has demonstrated that tactile cues such as vibrations can be useful for prompting in such areas as on-task behavior (Amato-Zech, Hoff, & Doepke, 2006; Legge, DeBar, & Alber-Morgan, 2010; McDougall, Morrison, & Awana, 2012), reducing problematic self-talk (Silla-Zaleski & Vesloski, 2010), and improving math fluency (Farrell & McDougall, 2008). While the MotivAider© is still a relatively inexpensive, useful, and discrete tool, tactile feedback is also available from other, even more convenient, sources, such as smart phones and smart watches. In fact, the MotivAider© technology is now available for download as a smart phone app.

Personal Digital Assistants (PDAs) are hand-held consumer devices that are readily available and fairly user-friendly. Current examples of PDAs include smart phones and tablets. Mechling, Gast, and Seid (2009) used Palm Pilots as PDAs to provide access to varied prompts to three adolescents with autism to increase independence in cooking. The participants were able to choose and deliver their own prompts – textual, pictorial, or video – on-demand as needed. All participants became more independent using this system, and in fact faded their own prompts as they were no longer needed.

PDAs were also used by Gentry et al. (2012) to provide access to self-prompting and other self-management tools to provide vocational supports for individuals with disabilities working in competitive employment. In this case, an Apple iPod Touch device was programmed by Occupational Therapists to provide individualized supports based on the particular job and the person's personal goals and preferences. Although not a formal research study, the case studies described by Gentry and colleagues support the use of PDAs to provide meaningful, personalized self-prompting tools to facilitate success in independent work for individuals with disabilities.

There may be advantages to using consumer technology to facilitate self-prompting for greater independence (Savage, 2014). Touch-screen mobile devices such as smart phones and tablets are highly accessible and appealing to just about everyone. Such mobile devices are particularly appealing to children and adults with disabilities, who may find them to be a more acceptable alternative to traditional, sometimes stigmatizing, assistive technology (Newton & Dell, 2011; Stephenson & Limbrick, 2015). Other benefits of consumer technology over traditional assistive technology are that consumer technology is relatively inexpensive, tends to be more durable and have a longer battery life, and can be used flexibly for more purposes than traditional assistive technology (Stephenson & Limbrick, 2015). Learners may also find technology-based supports to be more consistent, readily-available, and engaging than those provided by teachers or other support staff. Teachers may experience consumer technology as more user-friendly than assistive technology, and overall more efficient and easier to individualize than lower-tech teaching strategies. Finally, families and community members may find consumer technology to be easier to understand and interact with, and easier to support, when assisting or communicating with individuals with disabilities.

Of course, there are also drawbacks associated with technology in the context of supporting individuals with disabilities. Assistive technology, whether specifically developed for supporting those with disabilities or more readily-available consumer technology that is adapted for that purpose, shouldn't be used for its own sake, as a baby-sitter, or to replace social interaction (Newton & Dell, 2011). If the individual doesn't like technology, if it doesn't meet a particular need, and if it is more distracting than helpful, then technology shouldn't be used. Schools and agencies often purchase large quantities of devices without having a good plan for how to use them, resulting in wasted resources (Newton & Dell, 2011). Applications (apps) for consumer devices are also easy to buy impulsively, especially because they tend to be very inexpensive, but may not meet individual needs (Newton & Dell, 2011). Additionally, technology that is overly expensive or time-consuming to set up or use might not be appropriate for a given situation. For example, some individuals with ASD might find it easier and faster to simply jot a note on a post-it to remind themselves about an upcoming task or commitment, rather than programming an app to deliver a reminder. Whatever is most effective and most comfortable for the individual, and therefore most likely to be used, may be the best solution when choosing self-prompting strategies.

Even when technology is clearly appropriate and useful for supporting individuals with disabilities, obstacles may prevent effective implementation. Some reported obstacles to the use of technology with students with disabilities include lack of staff knowledge, access to adequate technology, and funding (Okolo & Diedrich, 2014). Tanis and colleagues (2012) add concerns with cost, issues with devices breaking, and lack of knowledge of what devices and applications would be most helpful as barriers to effective technology use. Future areas of research suggested by Stephenson and Limbrick (2015) include examining some of these issues, including those related to funding, as well as specific areas of application of technology for individuals with disabilities, comparisons of technology-based and traditional instruction, and use of technology by individuals with disabilities outside of intervention settings.

For individuals with ASD and other disabilities, self-prompting may be implemented, with or without technology, in two different ways. First, the teacher or other interventionist may set up the prompts, and provide any assistance necessary to teach the individual what the prompt means and how to use it. The second way to implement self-prompting is to teach the individual to set up the prompting strategies for him or herself. For some individuals, the concept of self-prompting may be taught as a skill set unto itself, and with proper instruction and support can generalize such that the individual sets up and responds to self-prompts in novel situations. Ideally, the individual will ultimately be able to follow a protocol such as that described by Clouse and Bauer (2016), in which individuals with intellectual disabilities are supported to set personal goals and self-management protocols for active engagement in self-determination.

Case Studies

Teacher-initiated self-prompting

Case study 1. Ian is a 4th grade student with ASD who participates in an inclusion class in his local public school. He usually forgets to leave the classroom for scheduled speech therapy.

Self-prompting strategy. Ian's teacher writes the time of his speech session on a post-it note each morning, and leaves it on his desk.

Outcome. Ian has learned to check the post-it note and to leave for speech on time without the teacher's verbal reminder. Ian's teacher finds this so helpful that she also begins to write the time of his music lessons on the post-it, and finds that Ian generalizes to leaving on time for music lessons as well, without the teacher's verbal reminder.

Case study 2. Lucy is a young woman with Down syndrome who works as a cashier in a neighborhood convenience store. Lucy sometimes forgets to count customers' change before handing it to them, occasionally resulting in a miscount of her register drawer.

Self-prompting strategy. The owner of the convenience store places a note inside the cash drawer saying "Count change 2 times!"

Outcome. Lucy begins to reliably count customers' change twice before handing it to them, resulting in fewer errors and a higher likelihood that her cash drawer is correct at the end of her shift. The owner of the store is pleased and offers Lucy more hours.

Case study 3. Phil is a teenager with multiple disabilities who is not writing his homework assignments in his agenda. He becomes upset when he gets home and doesn't know what to do.

Self-prompting strategy. Phil's parents set up several reminders in his smart phone, by programming his phone to vibrate five minutes before the end of each period. When Phil feels the phone vibrate, he looks at the screen to see a reminder that says, "Write down your homework."

Outcome. Phil begins to write down his homework in each class upon feeling the vibration of the phone and checking the screen. Gradually, Phil stops checking the screen and writes the homework just when he feels the vibration. Phil eventually self-fades the prompt by writing the homework before the reminder, and ultimately is able to delete the reminders from his phone and write his homework based on the usual cues to do so.

Student-initiated self-prompting

Case study 4. Joe is a young man with an intellectual disability who relies on his parents to wake him up at the correct time for school each weekday morning and for activities on the weekends.

Self-prompting strategy. Joe's teacher provides a lesson on how to set a cell phone alarm to the class. Joe is excited by this use of his phone and asks his parents to let him try waking up on his own. Joe sets his cell phone alarm clock each night before going to bed.

Outcome. Joe wakes up for school independently each morning. He adjusts the time of his alarm for weekend activities without prompting. Joe's parents no longer need to wake him up

for school or weekend activities. Joe generalizes this skill, and sometimes sets the alarm to remind himself when his favorite television show is about to start so that he doesn't miss it.

Case study 5. Fanny is a teenager with ASD who is working on using coping strategies to reduce frustration.

Self-prompting strategy. As Fanny learns each new coping strategy with her therapist, she writes it on a small card that she keeps in her pocket and references throughout the day.

Outcome. Fanny increases the use of coping strategies and decreases behavior that reflects frustration, like yelling or walking away. Fanny reviews the card each week with her therapist and updates it by removing strategies that she feels were ineffective, and adding new strategies as she learns them.

Case study 6. Becca is a 10-year-old girl with ASD who is learning to shower independently.

Self-prompting strategy. Becca's home support staff teaches her how to use a laminated, Velcro schedule. Becca learns to set up the schedule by ordering the pictures and hanging it in the shower prior to each time she takes a shower. After completing each step on the schedule, she removes the Velcro prompt for that step and puts it in a plastic bag. The last step on the schedule, after she dries herself, is to dry the pieces of the schedule and set it up for the next day's shower.

Outcome. Becca is independent in showering, and no longer needs her mother to stand in the bathroom and verbally prompt each step of the shower. Becca and her mother develop a similar schedule for brushing and flossing her teeth.

These examples show that self-prompting can be used by individuals with a variety of challenges, at different ages, and for different purposes. The examples also illustrate both high- and low-tech versions of self-prompting. For the most part, lower-tech versions of self-prompting are easy to set up and may be as simple as teaching an individual to manage the materials that have been used to prompt him or her by a teacher, parent, or other support person. Written notes, timers, and visual cues are commonly used in homes and educational settings. Taking the next step of teaching the individual to set up and respond to these cues independently brings them into the category of self-management.

Technology-based self-prompts may be more appealing and likely to be used by both individuals and those supporting them, however. As previously discussed, higher-tech interventions are often more acceptable and engaging, and have the added benefit of usually only having to be set up once. For example, an electronic activity schedule delivered on a tablet will not need to be re-created each time it used, the way a paper-based activity schedule may be. Table 1 suggests some currently available applications to facilitate various types of self-prompting.

Table 1
Suggested Applications to Facilitate Self-Prompting

Purpose of self-prompt	Tablet and smart phone apps
Reminder to start or stop doing something	iTunes: • Reminder & Countdown • Reminder, Alarm and Voice Reminders, Remind Me Google Play: • Countdown Days • Just Reminder Both: • Wunderlist (Apple Watch app available) • Cozi Family Organizer (Apple Watch app available)
Follow a sequence of events	iTunes: • Pocket Schedule – Class Schedule, Homework Planner • My Visual Schedule • Choiceworks • Children with Autism: A visual schedule (Apple Watch app available) Google Play: • myHomework Student Planner • First Then Visual Schedule • PictogramAgenda
How to do something or What to do in a specific situation	Both: • YouTube • WikiHow • Food Network in the Kitchen • Self-created videos/photos/written cues

Regardless of intellectual and linguistic ability, most individuals with disabilities can benefit from learning to self-prompt and use technology-based prompts to do so. Some key points to remember when teaching a student or adult to self-prompt are as follows:

- First, remember that the skill that you are teaching is self-prompting, NOT whatever the prompt is for. Therefore, a self-prompting program is not appropriate unless the individual has already mastered the skill that is being prompted. We don't use self-prompting to teach someone to cook independently while they are learning steps involved in cooking, but rather after they have learned those steps.
- Next, remember that self-prompting is a skill in and of itself that must be taught to many individuals. Simply setting up an app to remind the person to do something is not

teaching self-prompting. He or she may need intensive instruction in what to do when that reminder occurs, including how and when to "silence" or "snooze" the alert, how to follow through on whatever the reminder is prompting, and how to set up the reminder for the next time it is needed.

- Additionally, remember the distinction between teaching an individual to follow self-prompts that have been set up for him or her, and teaching the individual to set up those prompts independently. Both self-generated and other-generated self-prompts can be very meaningful in building independence, but obviously once the individual learns to set up his or her own prompts, the highest level of independence is achieved.
- It is important not to assume that self-prompting skills will generalize to different situations. Some individuals may need to be taught to self-prompt across a variety of contexts, such as home, school, and community, and across a variety of skill areas, such as self-care, academics, and social skills, before they begin to initiate and use self-prompting independently in new contexts and for new skills.

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