Chapter 2
Addressing Executive Function Using Assistive Technology to Increase Access to the 21st Century Skills

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ABSTRACT
Access to the common core and the general education environment are attainable goals for learners on the autism spectrum when their autism is clearly understood and meaningful supports and instruction are in place. This chapter focuses on one area that is often not addressed for students with Autism Spectrum Disorders (ASD) yet is critical to academic success: executive function. Specifically, this chapter overviews the executive function challenges related to ASD and technology supports in the executive functions areas of (a) information management, (b) materials management, (c) time management, and (d) self-management.

INTRODUCTION
The outcomes of adults with autism in terms of independent living, developing and maintaining meaningful relationships, and employment have generally been consistent since the 1960s (Henninger & Taylor, 2012). That is, sadly, the majority do not achieve a high quality of life – a finding that has been validated by self-reports of individuals with high-functioning autism spectrum disorders (HFASD) (Müller, Schuler, & Yates, 2008) as well as results of the National Longitudinal Transition Study (NLTS2) (Shattuck et al., 2012).

How can this dismal trajectory be changed? Learner outcomes will improve when they are taught meaningful skills. The 21st Century Student Outcomes and Support Systems (Partnership for 21st Century Skills, n.d.) have formally recognized that life success goes beyond academics by incorporating a focus on (a) Life and Career Skills; (b) Learning and Innovation Skills; and (c) Information, Media, and Technology Skills (see

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Table 1 for a brief description of these areas). In addition, it is important match the skills that need to be taught to evidence-based practices (EBP)—strategies that have been shown to be effective for learners on the spectrum (Centers for Medicare and Medicaid Services [CMS], 2010; National Autism Center [NAC], 2009; National Professional Development Center on ASD [NPDC], 2009) (see overview in Table 2).

While these competencies encompass numerous skills areas, many are related to a core challenge in autism spectrum disorders (ASD): executive function (EF). For the purposes of this chapter, EF skills are defined as those that allow us to (a) manage, organize, and process relevant information while screening out irrelevant stimuli; (b) manage the environment, including materials and space; (c) manage time; and (d) manage self, including regulating our behavior and emotions.

EF skills pose lifelong challenges for individuals with ASD; indeed, rather than decreasing, they increase with age (Rosenthal et al., 2013). That is, it is expected that all individuals, not just those with autism will assume responsibility for organizing themselves, their environment, time, and regulating their own behavior. As a result, when learners on the spectrum do not exhibit these skills, it does not mean that their behavior is willful. Rather, their lack of competence in this area reflects the failure of those who support them to provide appropriate instruction and/or supports in the aforementioned areas. That is, these skills are often assumed to be in place instead of directly taught and supported.

This chapter begins with an overview of AT, and is followed by a discussion of how AT can benefit learners with autism in (a) information management/processing, (b) materials management, (c) time management, and (d) self-management.

### Table 1. 21st century student outcomes

<table>
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<th>Outcomes</th>
<th>Skill Areas</th>
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| Core Subjects and 21st Century Themes | English, reading or language arts  
World languages  
Arts  
Mathematics  
Economics  
Geography  
History, government, and civics  
Global awareness  
Financial, economic, business, and entrepreneurial literacy  
Civic literacy  
Health literacy  
Environmental literacy |
| Life and Career Skills | Flexibility and adaptability  
Initiative and self-direction  
Social and cross-cultural skills  
Productivity and accountability  
Leadership and responsibility |
| Learning and Innovation Skills | Critical thinking  
Communication  
Collaboration  
Creativity |
| Information, Media and Technology Skills | Information literacy  
Media literacy  
Information, communications, and technology |
