Educating Students with Intellectual Disability & Autism Spectrum Disorder

Book 1
Research-Based Practices and Education Science

Council for Exceptional Children | DADD Division on Autism and Developmental Disabilities

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Contents

Introduction

When first planning for the *Educating Students With Intellectual Disability and Autism Spectrum Disorder* series, we had many conversations about the need for a comprehensive resource for educators that would provide the most up-to-date research- and evidence-based practices for teaching students with intellectual disability and autism spectrum disorder (ASD)—but one that was explicit enough to arm educators with the day-to-day strategies and practices they needed to support real kids in real classrooms. In order to accomplish this goal, each chapter for each book in this series was developed with the idea in mind that students have a wide range of support needs (e.g., communication, social, behavioral, learning goals). Unlike other books, you will not find specific chapters designated to ASD and/or intellectual disability categories. Rather, *all* chapters include research-based practices and strategies aligned to the needs of students with developmental disabilities, across multiple grade levels and support needs.

This first book in the series provides both an answer to the question "What is research-based practice?" and a comprehensive explanation of each learning stage: acquisition, fluency, maintenance, and generalization. This background sets the tone for the remaining books. Understanding student learning is essential to providing sound and appropriate education to all students. Whether the learning stages are sequential (e.g., first put on shoe, then work to put it on quicker and tie strings tight enough, then maintain skill over weeks, then work to generalize across multiple shoes) or intermingled (e.g., while building fluency in greeting peers, multiple students and places are introduced for generalization), each stage is present in learning and it is essential to plan this instruction. Although it is common for educational teams to plan for acquisition of new skills, or even generalizing a skill already learned to new contexts, in order for true mastery to occur we must continue to think a little deeper about learning and teaching to plan for instruction across all four stages of learning. Books 2 through 4 use the four stages of learning to guide the practical application of the knowledge and skills among foundational concepts (e.g., teacher leadership, collaborating with families) and content areas (e.g., transition, academic instruction) within special education.

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What Is Learning?

We define *learning* as the transformative process of acquiring new knowledge and skills that are readily available for use and future opportunities. Because learning does not happen all at once, teaching must reflect this developmental process. This first book in the *Educating Students With Intellectual Disability and Autism Spectrum Disorder* series provides an overview of the four phases of learning: what they are, the research basis for each, and how each stage is reflected in practice for students with ASD and intellectual disability.

The task of learning a new skill or concept is quite complex, when you really think about it: sometimes it takes weeks, months, or even years to acquire a new skill and then be able to apply it in meaningful ways. Take, for example, the experience of traveling internationally; maybe you have taken several Spanish courses growing up and know just enough of the language to "get by." At the beginning of your trip to Spain, when asked a question, you are able to respond—however, with such a delay that the other person typically moves on to the next person or figures out what you want via gestures and a mini game of charades. Over the next few weeks of your trip, you may start to gain fluency and speed in responses and become pretty confident in the language, even using Spanish in very congested and loud train stations. Every day, we are presented with situations similar to this one in which we are asked to use a skill in which we haven't used in months or years (think of riding a bike or using a new computer program). The overall goal of education is to make learning *meaningful*, to identify the curriculum and skills that students will use to increase their quality of life. All too often, students with intellectual disability and ASD are faced with situations in which they are unable to generalize their learning to meaningful contexts. Even being able to perform a skill with mastery during school may not guarantee the ability to use it effectively within the community due to not having achieved high levels of performance (e.g., competitive employment).

When thinking about planning for curriculum and skill development in the classroom and community for students with intellectual disability and ASD, it is essential that educators plan for initial acquisition, fluency, maintaining this skill over time, and generalization. Without each of these four stages of learning, only portions of the learning process are met. For many years, practical application of the learning stages has focused on the introduction of new skills and students' ability to apply those newly learned skills to new places, materials, and people (i.e., *generalization*). Although these two steps of the stages of learning are important, without assessing, planning for, and measuring fluency and maintenance as well we may not really be preparing students for long and useful application of their knowledge and skills in the real world.

How Do the Phases of Learning Work Together?

In this book, we introduce each of the four stages of learning and provide research-based rationale, explanation, and examples for teaching at that particular stage of learning. Although the four stages of learning have been discussed by multiple special education researchers over the past several decades, the order of each stage has been presented differently in each instance (Collins, 2007; 2012; Haring & Eaton, 1978). Although the order of *learning* may not differ across students or skills, the order of *teaching* can differ. We have sequenced the first four chapters in Book 1 to align with Collins (2007) as

1. acquisition,
2. fluency,
3. maintenance, and
4. generalization.

However, it should be noted that each and every stage of learning is dependent on the others through an interactive relationship (Kubina & Wolfe, 2005). For example, when setting up a lesson on price comparison in a grocery store, it may be appropriate to build in multiple materials and prices (i.e., generalization) while introducing the skill (i.e., acquisition). In addition, students who are not able to compare prices of items for purchase at a quick enough rate (i.e., fluency) while grocery shopping in different stores (i.e., generalization) might not continue to use the skill at all because it just takes too long and they need to get their shopping done. In this case, the lack of fluency negates cost savings as a reinforcer of the behavior—decreasing their chances to use the skill over time (i.e., maintenance).

The four stages of learning is the focal point of this first book and the common thread throughout the subsequent books in this series, which address the planning for and teaching of various skills and concepts; additional foundational concepts in special education are specifically addressed in Book 2 and woven through Books 3 and 4.

Again, while planning for and developing this book series, we wanted to address some of the challenges we have seen in the field and experiences in our own teaching; providing educators with additional tools to think critically about *how* we teach (i.e., learning stages), within the context of *what* we teach (e.g., academics, communication skills). However, in order to do this, we knew that educators also needed knowledge and skills surrounding some foundational skills that seem to greatly influence the success of our practice.

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Chapter 1

Acquisition

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Acquisition refers to the most basic stage of learning a new skill or concept (Collins, 2012), and can also be described as the ability to do something (which could not be done previously) with some degree of accuracy (Alberto & Troutman, 2009; Collins, 2012). The acquisition stage includes the very first exposure to, as well as instruction of, a skill which is not yet reliably been performed or self-initiated (Alberto & Troutman, 2009). In this stage, students often make mistakes in attempting a skill or task and are likely to require support (i.e., prompting, focused systems of reinforcement; Haring & Eaton, 1978). Skills at the acquisition stage are not performed quickly, independently, or under varying circumstances from those explicitly taught. Although acquisition is the initial and most basic stage in learning, skills for which a student has had neither exposure or any success can be considered to be in a "pre-acquisition" phase. In this phase, accuracy of skill performance is likely at or near 0%. Yet, as students begin to gain exposure and practice, they enter the acquisition stage of learning, focused on increasing consistency and accuracy. Once 60% accuracy is achieved independently (Snell & Brown, 2011) or 100% accuracy is achieved with support (e.g., prompting), a student is considered to have achieved acquisition and is ready to move on to the next stage of learning (see Table 1.1 for a description of stages surrounding acquisition).

Acquisition is a necessary first step in learning for more fluid, independent, and complex performance or applications; it marks the initiation to learning a skill that over time can be applied to daily life and more complex stages of learning. Skills in which students have achieved acquisition are not always directly applicable to real-world settings. For example, when learning to recall a new phone number, without support one might not be able to reliably state the number and might be prone to make mistakes such as mixing up or omitting numbers.

The end goal of the acquisition phase of learning is to develop or gain a new skill. However, this skill may be slowly produced, somewhat inconsistent, contextually performed, or in need of prompting and reinforcement. Learning in the acquisition stage is not independent, as the focus should be on performance of the skill with limited errors (Snell & Brown, 2011). Students may be able to complete the skill

Chapter 2

Fluency

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Chapter 1 addressed skill acquisition as the initial stage of learning. This chapter investigates the next stage of learning: fluency. When learners begin to use a skill with greater ease and efficiency, they are seen as becoming fluent. *Fluency* refers to the rate and accuracy of a response (Collins, 2012; Snell & Brown, 2011). Fluency, the stage in which learning begins to be useful (Alberto & Troutman, 2009), may be one of the most important stages of learning and should be specifically planned for in instruction. Skill fluency—the goal which follows the initial phase of learning—(i.e., acquisition)—is the ability to perform a skill correctly at least 60% of the time independently or 100% of the time with prompting. Fluency can be described as initial "mastery" due to the necessary precision and appropriate speed required for the knowledge or skill to be useful to the student (Haring & Eaton, 1978). In simple terms, fluency matters. Without fluency, students are not likely to maintain nor generalize skills that they learn.

Every skill taught requires some level of accuracy and speed, and speed and accuracy expectations can differ across contexts. It is possible for students to learn a new skill and perform it correctly under one condition (e.g., at school); however, when presented with the same skill under a new condition (e.g., community) they may need to increase their speed in order for generalization to occur. Likewise, a student may be able to complete the steps of a skill with speed and independence, but without sufficient accuracy. Table 2.1 describes the fluency phase as contrasted by preceding (pre-fluency/acquisition) and following (post-fluency/maintenance and generalization) phases. A student who demonstrates success performing a skill with accuracy and the appropriate speed is ready to enter into the next (post-fluency) stage of learning.

Planning for the fluency stage can be complicated. Accuracy typically comes before speed; however, as a student builds speed, accuracy should be closely monitored. It is not worthwhile to build speed at the expense of accuracy. Although the end goal of the fluency phase of learning is at least one occurrence of independent skill performance with high accuracy (i.e., > 60%), and appropriate speed (e.g., within 30 seconds), a student might not perform the skill

Chapter 3

Maintenance

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Although the maintenance phase is sometimes considered merely a component of other levels in the hierarchy of learning (i.e., acquisition and fluency; see Haring & Eaton, 1978), a more current conceptualization of learning development identifies maintenance as one of the four stand-alone stages (Alberto & Troutman, 2009; Collins, 2012; Snell & Brown, 2011). In line with advances in understanding, books in the *Educating Students With Intellectual Disability and Autism Spectrum Disorder* series will side with the latter position and adopt Alberto and Troutman's (2009) definition of *maintenance* as "the ability to perform a response over time without reteaching" (p. 43). Students who have achieved the maintenance phase in a particular skill show signs of habit, self-initiation, independence, accuracy, and consistency over time. Although a student's performance may be predictable at this point, the student cannot readily apply the skill in new settings nor when given novel cues or materials different from those used during instruction. For example, Juan may be able to zip up a light spring jacket with accuracy and timeliness at any opportunity, but has difficulty completing the same task with a larger winter jacket. Vanessa may be able to properly identify sight words on the classroom bulletin board, but has difficulty identifying the same words in story books or the newspaper.

Table 3.1 describes the maintenance stage as it shifts from pre-maintenance to maintenance and then to post-maintenance. Students within the pre-maintenance phase are not yet able to routinely perform a skill with sufficient accuracy or speed over time. Those within the maintenance phases are able to perform the skill with fluency over time—days, weeks, months, or longer after initial instruction. Students who have demonstrated flexible and consistent performance of skills over time have achieved the level of maintenance, and therefore are within the post-maintenance learning stage (i.e., generalization).

Skills in the maintenance stage are not always directly applicable or generalizable in a real-world context and are typically performed under specific circumstances. Such specifics could include a need for the same location, cues, materials, and interactive partners as those used in instruction in order for consistent and accurate performance. For example, Shareen can reliably demonstrate all of the steps of making chocolate chip cookies, without help, when she is in her home kitchen

Chapter 4

Generalization

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Generalization, perhaps the most important phase of learning, is the primary purpose of learning. The previous chapters outlined the three initial phases of learning: acquisition, fluency, and maintenance. This final stage of learning—generalization—occurs when a student can apply a skill in a consistent and fluent manner, in different ways or across multiple variables (i.e., people, materials, settings, situations; Collins, 2012). Although generalization occurs last in the hierarchy of learning (Haring & Eaton, 1978), instructional strategies for building generalization can be applied across all stages (Alberto & Troutman, 2009; Collins, 2012; Snell & Brown, 2011). In the generalization phase, the student is able to complete the skill accurately, independently, and consistently over time. Unlike the maintenance phase of learning, once generalized, a student's performance is predictable and can be readily applied to new settings or when given materials or cues that differ from those used in initial instruction. The primary focus of generalization is application. For example, Shareese is able to use her algebraic problem-solving skills to plan for a dinner party by determining the number of chairs needed if six people are coming over, and the table already has two chairs ($2 + x = 6$). She also can generalize the same skills to determine how many hours are left to shop at the mall before her bus leaves (2:00 p.m. + x hrs = 5:00 p.m. bus). Another example includes the ability to read and apply a weekday bus or subway schedule and generalize, or apply, these same skills to a different weekend bus or subway schedule.

Table 4.1 describes generalization in comparison to the stages that come before and after. *Pre-generalization* refers to learning that is in one of the earlier stages of learning (i.e., acquisition, fluency, maintenance). *Generalization with adaptation* refers to a part of the generalization stage which is defined by a more advanced form of the skill associated with problem solving and skill modification. Often, students learn a skill and are able to perform it across multiple contexts; however, over time the skill may not always be performed the same way or with the same exact steps. For example, identifying the title of a book (on the front cover), then years later being presented with an eBook would require the student to problem-solve and essentially understand the concept of a title and how to find it. Another example of generalization with adaptations may be the use of an ATM

Chapter 5

Research-Based Practices and Educational Science

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As noted in the Introduction, the *Educating Students With Intellectual Disability and Autism Spectrum Disorder* series is focused on providing information and resources regarding the research-based—and, if they exist, evidence-based—practices that exist for educating students with intellectual disability (ID), autism spectrum disorder (ASD), and other developmental disabilities. To understand what *research-based and evidence-based practices* are, it is important to first understand what *education science* is, the challenge with conducting educational science, and why practitioners should be interested in (or at least concerned with) education science and evidence- and research-based practices.

What Is Education Science?

Education science is the application of science (i.e., research) to education. In other words, education science is the field of education's exploration and understanding of what works. There are multiple approaches or methodologies researchers use to undertake education research (e.g., single case, experimental, qualitative, correlational), all of which involve educational researchers seeking to answer questions about education (i.e., the teaching and learning in formal [school] and informal settings involving students or children). It should also be noted that conducting education research is not easy (Berliner, 2002). In fact, Berliner (2002) stated education science was the "hardest science of them all" (p. 18). Unlike science that occurs in a lab or other controlled settings, the vast majority of education research occurs in schools—settings which researchers can seldom control and where random assignment to a condition is difficult. (Researchers are rarely allowed to randomly assign students to a classroom or some students within a classroom to one mathematical intervention and the others to a different mathematical intervention, or none at all.) In education research, multiple uncontrollable variables occur; in addition, the context of each school—which can include unique elements such as student population characteristics, school climate, community support, and so on—is a vitally important factor in applying and understanding education research in practice (Berliner, 2002).