Mrs. Bonds was the district autism specialist. She, along with teachers, therapists, and paraprofessionals, supported students with autism spectrum disorders (ASD) in preschool through 12th grade, across general and special education settings. Though the skills of the students she served varied tremendously, she noticed a common difficulty for many of her students with ASD, despite age or functioning level: a broad deficit in independent functioning. This impacted her youngest students as they learned basic school readiness skills, including gathering and putting away materials, or completing a basic sequence of activities, such as coloring, cutting, and gluing. This same difficulty made it hard for her older students to follow more complex response chains and manage all of their belongings, materials, and assignments throughout the day. Mrs. Bonds needed an intervention that could address this difficulty, one that would be appropriate for a variety of students in a number of settings. After careful review of evidence-based practices and discussion with colleagues, she decided to implement work systems, an element of structured teaching developed by Division TEACCH, with several of her students.

An important goal for all students is the ability to function independently throughout the school day—moving from one location to the next, organizing required materials, completing necessary tasks, and applying skills learned in one setting to other settings when appropriate. Although this goal is a priority for all students, it is even more important for students with ASD, as independence is the key to successful community inclusion and future employment. In a study of 68 adults with autism with IQs measured above 50, two thirds were not employed and only 3 lived independently, likely due to the well-documented difficulties in independent performance (Howlin, Goode, Hutton, & Rutter, 2004). This difficulty in independent performance has been recognized as a programming priority by many in the field (Lord & McGee, 2001; Olley, 1999). Lord and McGee identified “independent organizational skills . . . such as completing a task independently” as one of eight recommended educational objectives for students with autism (p. 218). Olley noted that “the goals of all curricula and methods are to assist students to work independently” (p. 602).

The development of independent skills is an essential curricular goal for students with ASD; it is also essential that staff like Mrs. Bonds who support students with ASD understand the complex skills required for independent performance. In addition, it is helpful to understand what challenges students with ASD may face when
developing and demonstrating the skills necessary to complete an activity on their own.

Mrs. Bonds wanted to implement an intervention that would really work; her first step was to try to better understand why independent performance was so hard for her students, even those who were fully included in academic classes. She wanted to know how her students thought and what was impeding their progress.

Learning Needs in Students With ASD

Active engagement is one of the strongest predictors of learning for students with ASD (Iovannone, Dunlap, Huber, & Kincaid, 2003; R. Koegel, Koegel, & McNerney, 2001). When actively engaged, people attend to, recognize, analyze, and store important details or information (Quill, 2000), and then use these details to construct meaning (i.e., integrate information for meaningful purposes). However, traditional teaching techniques such as lectures or lengthy verbal instructions may limit or inhibit engagement and independence of students with ASD (Carnahan, 2006). These techniques may not take into consideration the unique needs of students with ASD in the areas of attention, organization and sequencing, initiation, and generalization (Rao & Gagie, 2006).

Attention

Many individuals with autism are unable to attend to multiple stimuli or environmental cues (Quill, 2000). These individuals demonstrate stimulus overselectivity (Reed & Gibson, 2005), or attention to a limited number of environmental cues at one time. Students with ASD may attend to specific parts or aspects of a situation without regard for the context within which the situation occurs (Happe & Frith, 2006; Quill). Overselective attention, or attention to parts rather than wholes, limits an individual’s ability to understand the “big picture” (Happe & Frith, p. 6). This is especially true as task demands increase or situations become more complex (Reed & Gibson). This difference in attention may influence students’ abilities to perform independently as they may not attend to all of the steps required for task completion, such as missing the directive to put one’s name on a paper before turning it in. Similarly, students may not understand how completion of an independent routine fits into the larger school day. For example, the student may not see how his difficulty gathering his books at the end of the day before boarding the bus may impact the entire bus schedule.
Organization and Sequencing
Completing an activity from start to finish is challenging for many individuals with ASD, a result of differences in organizing and sequencing information from the environment. Organizing and sequencing require dual focus, the ability to know what has to be completed first (or next), while simultaneously understanding the relationship between steps and what the end result should look like. Students with ASD may not be able to determine how to approach a situation, identify exactly what needs to be done, and set an appropriate goal or plan. They may not be able to identify the tasks to accomplish or determine where to start, and may not be able to sequence and implement specific steps to achieve a goal, especially when facing other distractions (Fisher & Happe, 2005). Because they appear not to know what to do, students with ASD often require additional prompts, or are reprimanded for not completing a task.

Consider the task of organizing a desk or work space, a job that most school staff expect students to complete independently and rather quickly. The ability to organize and sequence information from the environment is crucial to completing such a task. In order to organize the desk area, students need to identify the problem (e.g., papers are not getting home, homework is missing); set a goal (e.g., put all homework in the red folder, throw away dated materials); and develop a plan to meet the goal. After establishing a plan, the student gathers the necessary supplies (e.g., folders, pencil case) and begins organizing. For students with ASD, this task may be overwhelming and immobilizing.

Initiation
Individuals with ASD often do not independently initiate the completion of steps during classroom activities (L. Koegel, Carter, & Koegel, 2003; R. Koegel et al., 2001). Though students may have learned a school-based routine, such as getting out the science materials required for a lab activity or the steps followed when checking out a library book, prompts may still be required to initiate each part of the routine. Individuals with ASD often learn to wait for prompts, which impedes initiation and independent functioning. This difficulty with initiation is likely impacted as well by their difficulties with attention, organization, and sequencing.

Generalization
Many individuals with ASD have difficulty generalizing skills learned in one environment to new environments (L. Koegel, Koegel, Harrower, & Carter, 1999). They may also demonstrate behavioral differences from one setting to another (Lord & McGee, 2001). Many individuals with ASD demonstrate a detail-oriented processing style, focusing on specific details of an event, routine, or concept, without connecting the details that create meaning (Happe & Frith, 2006). Focusing on specific details without attention to the bigger picture causes an individual to miss the central principles or components that would allow generalization of skills across environments (Hume, 2004).

Mrs. Bonds could certainly relate to all that she read about the attention, organization, sequencing, and initiation of individuals with ASD. It was her reading about generalization difficulties, however, that highlighted a number of the challenges her students faced relating to independence. She thought in particular about Jacob, a third grader with ASD. Although Jacob was able to unpack his backpack when he arrived at school, he was unable to repack it at the end of the day as he prepared to ride the bus home—despite the fact that the routine was the same, just reversed. After reading about generalization difficulties, Mrs. Bonds understood why Jacob was having difficulty with the independent performance of his afternoon routine: In the morning, a paraprofessional was in the classroom and provided the initial verbal prompt, “unpack your bag,” followed with proximity prompts. As Jacob took each item out of his backpack, she moved in the direction of the bin, shelf, or folder where the item belonged. For example, as Jacob took out his lunch bag, she stepped toward the large bin designated for packed lunches. Jacob paid close attention to these prompts; in fact, he attended more to her proximity than to the items he took out of his bag or the designated locations. Jacob missed the principle of “unpacking” his bag. Without this staff member in place, Jacob was not able to perform the routine, even though he was very familiar with each step.

Difficulties in generalizing behaviors and detail-oriented processing significantly influence the ability of individuals with ASD to participate independently in many different environments. Specifically, these characteristics may lead to overreliance on adult prompting and decrease the potential for independence at school and in the community (Mesibov, Shea, & Schopler, 2005).

What Is a Work System?
A work system, an element of structured teaching developed by Division TEACCH, is a visually organized system designed to promote understanding and clarity for individuals with ASD (Hume & Odom, 2007; see boxes, “What Does the Research Say About Work Systems?” and “What Is Division TEACCH?”). Work systems rely on predictability and clarity to promote understanding of the environment and expectations (Mesibov et al., 2005), and offer a tool for assisting students with ASD in focusing on important details, maintaining attention to tasks, and generalizing skills learned in one
setting to new environments. Specifically, work systems provide specific directions about what to do (e.g., sequence of activities) in a given area of the classroom or school building, while also providing a systematic work routine—working from left to right or top to bottom. Work systems can be used in a variety of settings and for a variety of purposes, including routines that occur throughout the school day, independent work time, and small-group lessons. The goal of a work system is to organize tasks and activities in ways that are comprehensible to students with ASD. This systematic and organized presentation of tasks and materials visually answers four important questions (Mesibov et al.):

1. What activities do I complete?
2. How many activities do I complete?
3. How will I know when the work is finished?
4. What will happen after the work is complete?

Using visual organization, work systems meet the needs of students with ASD and similar learning characteristics in several ways; they

- Highlight important information and help limit distractions.
- Offer clear and predictable sequences of activities.
- Minimize the need for verbal instructions.
- Minimize the need for adult prompting.

**Implementing a Work System**

All work systems tell the student what to do first, next, and last. However, the unique needs of each student will guide decisions about the type of system to use. Structured work systems can have simple or complex designs and can be concrete or abstract, as long as the design aligns with the skills and attributes of the individuals using them. The design of an individual work system for a student who does not yet read or write will be different from the design of a work system for someone who is able to read and comprehend written directions. Similarly, the work systems of students who are able to travel from one area to another without adult support will look different than work systems designed for students who require adult prompts to move from one area to another.

**Prioritize Student Needs**

The first step in designing a work system is to determine what activities or routines require independence. Possibilities in the school environment include completing several academic or leisure tasks independently, going through the cafeteria line, or using a vending machine.

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**What Does the Research Say About Work Systems?**

Recent research has demonstrated the efficacy of the work system in increasing on-task behavior and productivity in three students with autism, while decreasing the number of prompts required from adults (Hume & Odom, 2007). To reduce transition time and adult prompting, Dettmer, Simpson, Smith-Myles, and Ganz (2000) incorporated several elements of an individual work system (e.g., finished box, pictorial cues) in another study involving three children with autism. The supports were successful in reducing latency between instruction and student response and in decreasing adult prompting. Additional studies have shown the effectiveness of structured teaching methods for (a) promoting the independent performance of children with autism and severe intellectual disability during work sessions and transitions (Panerai, Ferrante, & Caputo, 1997); (b) reducing self-injurious behavior (Norgate, 1998); and (c) increasing the vocational skills in individuals entering the job market (Keel, Mesibov, & Woods, 1997).

Several studies have compared the TEACCH program with other interventions (Ozonoff & Cathcart, 1998; Panerai, Ferrante, & Zingale, 2002), and shows statistically significant gains in all areas on the Psychoeducational Profile-Revised (PEP-R; Schopler, Reichler, Bashford, Lansing, & Marcus, 1990).

**Choose Work System Format**

The next step is to choose the type of presentation for the work system. For a concrete learner with beginning-level skills, a left-to-right work system will likely be most appropriate (see Figure 1). The system teaches the student to move items from left to right as they are completed. All of the items needed to complete the activity should be arranged before the student arrives to the assigned location, and organized in containers, folders, envelopes, trays, or shelves. On the student’s right should be a location for completed or finished materials (Dettmer et al.,

**What Is Division TEACCH?**

Division TEACCH (Treatment and Education of Autistic and Related Communication Handicapped Children; www.teacch.com) is a comprehensive statewide program based at the University of North Carolina at Chapel Hill and serves children and adults on the autism spectrum. Founded in the early 1970s, Division TEACCH provides services to individuals with ASD and their families, conducts training worldwide on effective teaching practices, and participates in research activities.

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Mrs. Bonds decided that Jacob’s need to pack his backpack was certainly a priority; his difficulty resulted in frequent tardiness to the bus, which led to great frustration for the bus driver and other students.
— a “finished” box, basket, shelf, or table. In addition, the work space should include visual information (e.g., object, picture, word) about what activity the student will be participating in next (Schopler et al.).

Left-to-right and other more sophisticated work systems (see Figure 2) can be used throughout the school day—during academic activities, language groups, independent work times, and across age ranges. Work systems are helpful for older students who are able to match and sequence activities, yet still struggle with organizational skills. The use of a matching work system or a list work system may be most meaningful to some students with ASD. Instead of a student using or completing all of the materials/tasks on the left, a matching or written work system indicates exactly what activities will be completed and in what order. Matching and written work systems can be used in a variety of activities in the classroom and community.

Teach the Student the Work System
Once the work system is set up for the student, staff should teach the student how to use the system. It is important to ensure that any adults providing prompts (and the prompts themselves) do not become part of the work routine for the student. Staff should stand quietly behind the student while prompting to ensure that the work system materials (rather than the adult and/or prompts themselves) are in the student’s view. Follow a least-to-most prompting hierarchy (Repp, Karsh, & Lenz, 1990), first presenting the work system materials to offer assistance (e.g., the task, the finished box); then providing a nonverbal, gestural prompt; moving next to a verbal prompt; and finally providing physical assistance if needed. If verbal prompts are necessary instructions should be concise.

Figure 1. Left-to-Right Work Systems

The toy train indicates that he will go to the play area when he is finished.

The CD player indicates that he can listen to music when he is finished.
Mrs. Bonds decided that the left-to-right work system was a perfect fit for Jacob’s backpack packing intervention (see Figure 3). Though the work system required some minimal set-up by a staff person or peer, Jacob was quickly able to learn the work system routine and could pack his backpack quickly and independently.

Collect Data
A final and essential step in the implementation process is collecting data on student performance in the use of the work system. Data may be collected on the level of prompting required for the student to successfully manipulate the work system (see Figure 4). In addition, it is recommended that staff collect data on the target behaviors that served as the impetus for work system implementation (e.g., overreliance on adult prompting, off-task behavior, low productivity). These data may be collected and graphed so staff can make informed decisions about the success of the strategy (See Figure 5).

In collecting data on student use of a matching work system in math class, for example, Task 1 may be a measuring activity in the textbook and Task 2 may be a measuring work sheet. The student would receive a score of “6” on “Approaches Task” for Task 1 for

Figure 2. Matching and Written Work Systems

Matching work systems (see Example A) are more sophisticated than left-to-right systems in that they require an individual to be able to match attributes (e.g., color, number, shape, pictures, etc.). A Velcro strip is affixed to the student’s work space and activity areas (i.e., individual desk, small group table, restroom, etc.) and contains numbers, letters, pictures, and so forth, that correspond to designated activities. The student takes the first icon and matches it to the corresponding activity. After completing the designated activity, the student obtains the next icon and moves it to the corresponding activity. The last item on the list tells the student what to do after completing the task.

Example A

1. Enter returned books into computer
2. Return box of books to shelf.
3. Return books on tables in children’s section
4. Surf the Internet until 3:15 PM

Example B

The student takes the top letter and matches it to the corresponding folder on the left. Once all of the letters are matched and the activities are completed, the student transitions to the activity indicated at the end of the work system.

A written work system also answers the four work system questions for students. The written list (see Example B) describes both what activities need to be completed and how many activities need to be completed. Students are provided with an overview of all required activities, and learn that they are finished when each activity is crossed off. Students may use a finished box or may replace materials when they are finished.
independently matching the letter from the work system to the letter on Task 1. If she has difficulty beginning the task and the teacher needs to point to the textbook to help her get started, then she would receive a score of “4” for “Begins Task.” The student would receive a score of “6” for “Completes Task” if able to complete the task without further prompts. Finally, a student who requires physical assistance to place the activity back in the lettered folder would receive a score of “2” for “What’s Next.” The goal is for adult prompting to decrease over time as the student becomes more proficient in the use of the work system. Scores should move from low scores, indicating a low level of independence (and high level of prompting) to high scores, indicating a high level of independence.

The issues Jacob faced regarding organization, sequencing, initiation, attention, and generalization were alleviated and the data on Jacob’s work system indicated that he was able to complete the steps independently for almost 90% of the opportunities.

Adapting Work Systems to Student Needs

Mrs. Bonds was so pleased with Jacob’s response to the left-to-right work system that she was eager to try the same intervention with another student. Kate was a middle school student with ASD who struggled when it was time to practice a newly taught skill. Her math teacher would teach a skill; after practicing in small groups, students were expected to complete two or three tasks on their own to generalize the skill. Kate often just sat during this time because she missed some of the verbal directions and had difficulty locating all of the required materials. Mrs. Bonds decided to implement a matching work system for Kate that could assist in clarifying what activities were to be completed and in what order. She set up a series of folders labeled with letters on a shelf near Kate’s desk. Each folder contained materials required for the independent math activities, such as a ruler and worksheet, a calculator and textbook, or word problems and manipulatives. On Kate’s desk Mrs. Bonds placed a small strip of paper with the same letters to indicate what folders Kate should use that day. In addition, Mrs. Bonds wrote a note about what activity Kate would transition to when those math activities were finished. Mrs. Bonds also decided that Kate didn’t need a separate finished basket, as she understood that abstract concept. Instead, Kate was taught to put the materials back in the folder where she found them.

Mrs. Bonds tried another work system with a high school student, Kalif, who had difficulty when he went to his job at the local public library. He was able to arrive and punch in independently, but then typically relied on a job coach or co-worker to get started on each task. Though he knew how to do each job, he required assistance in initiating the activity and understanding the order in which activities should be completed. He was often off task while he waited for prompts. The tasks varied from day to day, needed to be finished in a specific order, and required organization and sequencing. Mrs. Bonds could have used a left-to-right work system by setting up the required tasks, such as filing and stamping books, on his left and a finished shelf on the right, or a matching work system, by labeling each activity with a visual cue and giving Kalif corresponding cues. Instead, because of Kalif’s ability to read, comprehend, and follow a numbered list, Mrs. Bonds decided to set up a written list work system. After punching in, Kalif received a list of three tasks he was to
complete while working at the library. When he was finished with each task, he crossed it off the list, and moved to the next one. At the end of the list was a written cue directing Kalif to the next activity, which was typically something he enjoyed. This provided additional motivation for Kalif to complete his work in a timely way.

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**Code**

1 = Fail
2 = Physical Prompt
3 = Verbal Prompt
4 = Gestural Prompt
5 = Material Prompt
6 = Independent

**Note.** Data sheet developed by Division TEACCH (Ament, 1999) to track student usage of independent work systems. Data are collected on level of adult prompting. Adult prompting should decrease over time (moving from physical prompts, if needed, to independence).

Final Thoughts

The changes in Mrs. Bonds’s students were similar to those documented in the research (Hume & Odom, 2007). Her data indicated that the students using work systems demonstrated higher levels of independent functioning, measured by increases in on-task behavior and decreases in adult prompting (Figure 5 reflects Kalif’s data). In addition, she noted that students were generalizing more effectively when work systems were in place across setting. Anecdotally, she reported that productivity was rising, as her students began to better understand how many tasks or activities were required, when they would be finished, and learn to anticipate a following activity. As her students progressed she began to increase the complexity of the work systems. For example, after Jacob mastered the left-to-right work system, Mrs. Bonds introduced a matching work system for packing his backpack. She hoped to eventually use a written work system as his literacy skills developed.

Independently moving through the school day is a crucial skill for students with ASD. Activities that other students seemingly find easy, such as transitioning from one location to the next, organizing learning materials, and completing assigned activities can be challenging for students with ASD. By using structured work systems, educators address the unique learning styles and challenges experienced by these students. Such systems provide concrete and meaningful information—increasing engagement and independence, decreasing anxiety, and ultimately helping students experience more success across settings. The steps described in this article offer educators a foundation for implementing work systems and preparing students for future success.

References


Figure 5. Data Collected by Division TEACCH to Track Kalif’s Usage of Independent Work Systems


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