



**Connecting Assessment  
and Instruction for Individuals**

Authors:



# LINKS™ Implementation Guide

## Section II



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## Section II

# Research-Based Support for the Links™ Curriculum

The Links Curriculum integrates recommendations for best practices from the current literature and relies on evidence-based strategies to guide assessment and instruction. General recommendations from the National Research Council (2001) are incorporated into Links by:

- Providing a systematically planned curriculum focused on developmentally appropriate activities with specific educational objectives
- Combining opportunities for individualized instruction, attention, and group/social interaction
- Emphasizing the most common priorities for students with ASD and other developmental disabilities including spontaneous communication, social instruction in diverse settings, cognitive skills, and proactive approaches to reduce behavioral issues
- Embedding instruction in settings where students with disabilities can interact with typically developing peers

In addition to adopting the general recommendations for best practices, Links also integrates specific themes and utilizes evidence-based methods for instruction. Table 5 presents core themes of instruction and evidence-based methods that are in alignment with current literature and utilized throughout the Links Curriculum.

*Table 5.  
Core Themes and Evidence-Based Instructional Methods Incorporated into the Links Curriculum*

Themes of Instruction (National Research Council, 2001; Snell & Brown, 2006; Wehmeyer, 1998)	Instructional Methods (National Autism Center, 2009; National Professional Development Center, 2010; Snell & Brown, 2006)
<b>Content of Instruction</b> (National Research Council, 2001; Snell & Brown, 2006)	
Independence Self-Determination Functional and Generalizable Skills	Principles of Applied Behavior Analysis Discrete Trial Training Task Analysis (i.e. Functional Routines) Visual and Environmental Supports Antecedent-Based Strategies Positive Behavior Strategies and Supports Self-Management Techniques Augmentative Communication Systems Modeling/Imitation strategies Joint Attention Student Schedules Reinforcement Structured Work Systems Peer Mediated Instruction Prompting Strategies
School and Community Routines Responding to Language Communicating with Others Functional Academics Engaging in Diverse Activities Social Skills	

Links combines assessment and the instructional processes listed in Table 5 using online and print materials in both school and community settings to increase student independence. It has been suggested that this combined approach is the most appropriate method for implementing evidence-based curriculum for students with ASD and other developmental disabilities (Kavale & Forness, 1999). Emphasizing skill generalization to enhance independence is also considered a critical component in the development of an appropriate curriculum for this population of students (National Research Council, 2001) and is interwoven throughout the Links Curriculum. Links capitalizes on students' strengths, interests, and abilities and individualizes the assessment and instructional process in natural environments. Additionally, the Links Curriculum encourages instructors to identify appropriate educational objectives based on assessment data and provides structured lesson plans that target specific skills relevant to students' unique needs, also a key component of an evidence-based program (National Research Council, 2001). Links utilizes evidenced-based techniques (e.g. discrete trial training) to teach essential concepts and skills. The Links Curriculum enables users to generate reports that provide immediate feedback to instructors, parents, and school administrators regarding student progress, thus encouraging revision and/or redirection of the focus for instruction to increase student independence.

## The Role of Functional Routines in the Links Curriculum

The National Professional Development Center (2010) indicates that “task analysis” is an evidenced-based strategy that can be used when educating children with ASD. This strategy along with discrete trial training (DTT) are the fundamental assessment and instructional methods integrated into the Links Curriculum.

As discussed in Section 1. Introduction to the Links Curriculum, 47 task analyzed routines are utilized in Links and provide the primary contexts within which the assessment and instructional activities occur. Routines are activities that occur at predictable times, with a predictable sequence of steps, and with predictable expectations for participation and independent performance. Examples of routines include Going to School, Eating During Lunch, and Socializing with Friends. In behavioral terms, a routine is a chain of behaviors (Alberto & Troutman, 2009; Cooper, Heron, & Heward, 2007). An environmental event, such as instructions from a teacher, the presence or absence of an object, or modeling by peers, serves as the discriminative stimulus that signals the student to initiate a routine or a specific step within a routine. The completion of each step serves as the discriminative stimulus for the next step. Following the steps of the routine results in a functional outcome, such as completing a work task, purchasing an item, or playing a game with peers. Functional outcomes may also be embedded within a routine, such as engaging in a favorite activity as one part of the Recreational Activity Routine. These functional outcomes often serve as reinforcement for typically developing students, and, as students learn the predictable sequence of the routine, completion of each step in the routine provides conditioned reinforcement for the previous steps.

Throughout the Links Curriculum, functional routines are integrated into the school day for students at all four Learning Levels. During routines, students are provided with opportunities to apply the skills they learned in the Links Lesson (e.g., making requests, using a daily schedule, naming people). Encouraging students to practice acquired skills in the natural environment promotes skill generalization, thus leading to increased independence.

## The Role of Discrete Trial Training and Other Evidence-Based Strategies

DTT is the primary method used to teach skills and concepts in the Links Lessons. Each Links Lesson focuses on teaching one skill or concept. The skill or concept is broken down into small teachable components. Links Lessons provide the necessary information to implement the DTT strategy by indicating the appropriate instructional cue, expected student response and consequence for each skill component. The DTT strategy has been successfully used in many programs for student with autism (Arick, Young, Falco, & Krug, 2003; Lovaas, 1987). The Links program incorporates the use of the DTT strategy along with many of the other evidence-based strategies listed in Table 5 including prompting, reinforcement, positive behavioral strategies and support, visual and environmental supports, and antecedent strategies.

The Links Curriculum also uses a comprehensive process to promote errorless learning. This process includes the appropriate selection of lessons at a student’s developmental level, Sequential Learning Steps to introduce new skills and concepts, DTT procedures, chaining procedures to teach more difficult steps for students as needed, and an Errorless Learning Procedure emphasizing prompt fading for appropriate students. The Errorless Learning Procedure is described in each Links Lesson and on the Instructional Data Form. The use of an Errorless Learning Procedure to teach discriminations is well documented in the literature as an effective strategy for students with autism (Green, 2001).

Links also provides instructors with access to visual materials that allow students with diverse learning styles to understand, acquire, and communicate skills necessary to achieve their personal and educational goals through self-directed learning strategies (Agran, 1997). All of the aforementioned components are included in one package so that instructors can immediately begin assessment and instructional procedures with their students upon receipt of the Links Curriculum. The comprehensive nature of the curriculum ensures that instructors can implement the curriculum with fidelity, as designed.

# Links Curriculum Research

## Reliability and Validity data for the Assessment System Used in the Links Program

A major field test was conducted in the state of Oregon during 1999-2000 to determine the reliability and validity of the measurement system that is utilized in the Links Curriculum. Thirty school districts, 133 instructors, and 478 students with moderate to severe disabilities participated in the study (Arick, Nave, & Hoffman, 2000). The goal of the study was to determine whether the Independence Scoring Scale used in the context of the assessment of routines accurately assessed student functioning levels. Reliability of the observed routine assessment scores was very high. Pearson product-moment correlation coefficients were analyzed to determine Test-retest and Inter-rater reliability. Results were significant at the .05 level and were found to be in the range of .81-.97 between observations of routines over time (test-retest reliability) and between multiple observers (inter-rater reliability).

Significant results were also found in terms of concurrent validity when comparing Independence Scores with the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984) scores. The correlation between the Independence Scores and the Vineland Adaptive Behavior Scales were found to correlate at acceptable levels for concurrent validity (between .40-.70). In addition, moderate to high correlations were found between the initial teacher perception ratings and the actual observed assessment scores for the participants' performance (.57-.83). The assessment system utilized in the Links Curriculum is an expansion of this earlier work and utilizes the same scoring scale, focuses on the same population, and follows similar procedures for the assessment process. A more detailed summary of these results can be found in a technical adequacy report written for the Oregon Department of Education (Arick et al., 2000).

## Pilot Study Results: Increased Student Independence During Routines

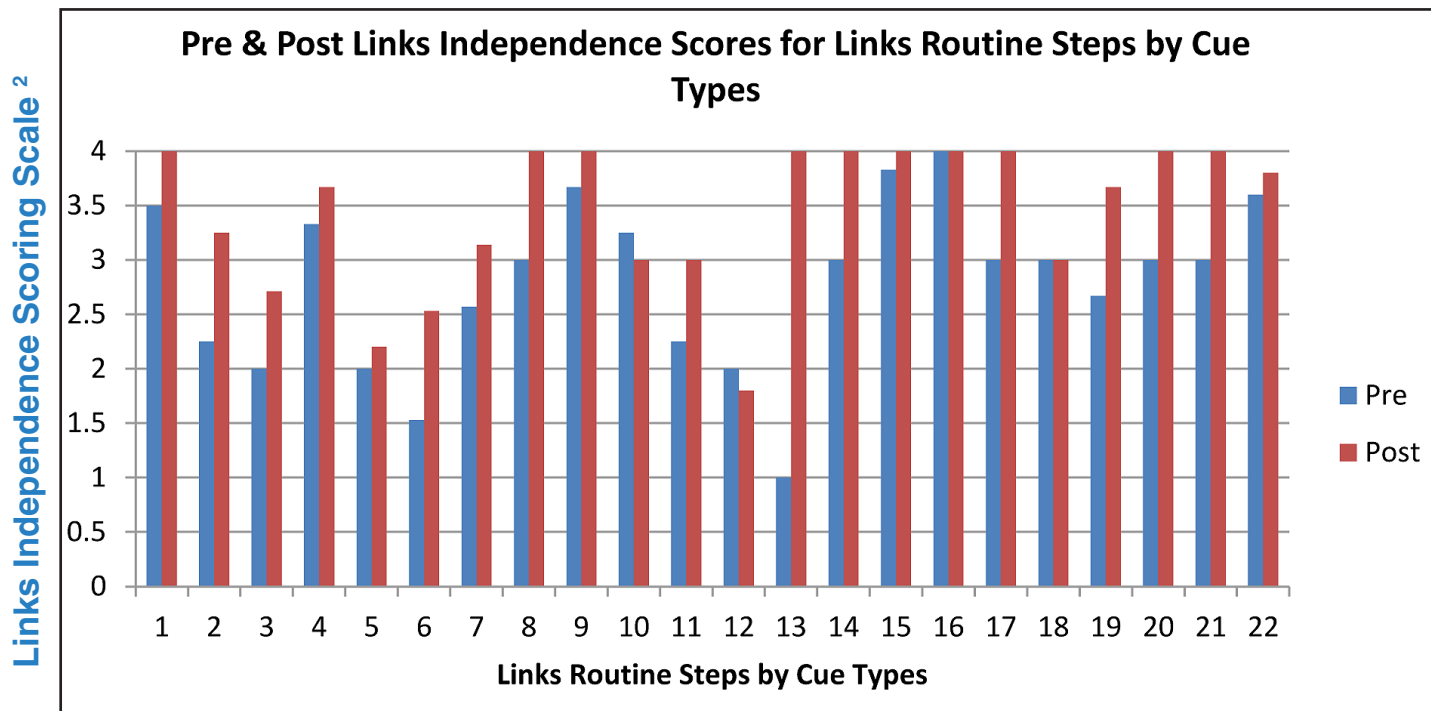
The Links Curriculum was implemented by a group of instructors residing in several areas of the U.S. A pre-post single subject design was utilized. The instructors were provided with introductory training, and then followed the Links Curriculum process outlined in Figure 1. Links Curriculum Process (see Section I. Introduction to the Links Curriculum). Initially, instructors used Links Online to assess their students and develop individualized functional routines. The instructors then assessed their students in the natural environment using the Observed Routine Assessment (ORA) that was developed in the previous step. After conducting the ORA, instructors identified appropriate Links Lessons based on the assessment data and provided instruction on the targeted skills to each student. Following instruction, the instructors repeated the ORA in the natural environment to determine if the student had generalized his/her skills acquired from the Links Lessons, thus increasing his/her independence in the Links Routine as a whole. An average of two months occurred between the initial ORA and the post-instruction ORA.

At the conclusion of the Pilot Study, an analysis of the pre-post results was conducted. Data from the Pilot Study indicated that of the 10 subjects, 90% of the students' Estimated Links Adjusted Independence Score<sup>1</sup> (LAI) improved across all routines selected. This indicates that 90% of the students made progress on their selected routines.

In addition to the analysis on student performance for overall independence, analysis was conducted on the pre-post gains for each type of instructional or natural cue selected within each routine. A (Modeling), B (One-Step Directions), C (Multiple-Step Directions), and D (Natural) Cue Types were compared for pre-post instruction differences. Twenty-two comparisons were analyzed. For cue type and for each step within a selected routine, students were scored based on their level of independence. The Links Independence Scoring Scale ranges from 0-4. A score of 0 indicates that the student could not complete a step with any form of prompting (e.g., visual, verbal, gesture, or physical). A score of 4 indicates the student completed the step independently (no additional prompting). The results of this analysis showed that students made progress on 90% of the steps identified with a specific cue type. The average amount of gain across all cue types was 23%. This indicates that students improved on average one full point on the 0-4 Links Independence Scoring Scale in a short period of time. Figure 2 presents the results for each pre-post comparison and shows the progress between pre and post Links Lesson instruction.

<sup>1</sup> The Estimated LAI score is an adjusted score based on the type of cue provided to the student (Modeling, One-Step Directions, Multiple-Step Directions, or Naturally Occurring Cues) and the amount of prompting the student required.

Figure 2. Pilot Study Pre-Post Assessment Progress on Independence



Note. Links™ Independence Scoring Scale: 0 = Did not perform with any form of prompting; 1 = Continuous physical prompt; 2 = Intermittent physical prompt; 3 = Gesture/visual/verbal prompt; 4 = Independent. Cue Types represented in the graph on the horizontal axis are: 1-9 are A Cues (Modeling), 10-16 are B Cues (One-Step Directions), 17-20 are C Cues (Multiple-Step Directions) and 21-22 are D Cues (Natural cues).

### Pilot Study Results: Users Found Links to Increase Effectiveness and Efficiency of Classroom Assessment and Instruction

Instructors were surveyed at the conclusion of the Links pilot test and provided qualitative feedback regarding Links Online (e.g., content of assessments; selecting routines; conducting ORAs; data entry), Links School and Community (e.g., identification of appropriate lessons; content of the Links Lessons; implementation of lessons; associated data forms), and the overall Links Curriculum and process.

The overarching feedback provided by instructors was overwhelmingly positive. In general, instructors indicated that the Links Curriculum process was easy to follow, logical, and could be smoothly integrated into a typical school day. Overall, the Links materials were clear and streamlined with the Links process. Instructors also indicated that Links provided them with guidance in terms of best practices related to assessment and instruction for students with ASD. Instructors also liked that Links is a strengths-based approach and helped them facilitate student independence while providing differing levels of support. Finally, instructors liked the flexibility of the curriculum in terms of the multiple stages of routines, learning levels, contexts (school and community), and the ability to select as many targeted routines as was appropriate for their students.

In terms of assessment, Instructors indicated that Links Online helped them target their students’ unique challenge areas and then plan instructional sessions based on assessment data. They shared that the Observed Routine Assessment Form was straightforward, user friendly, and the scripted cues on the ORA were helpful.

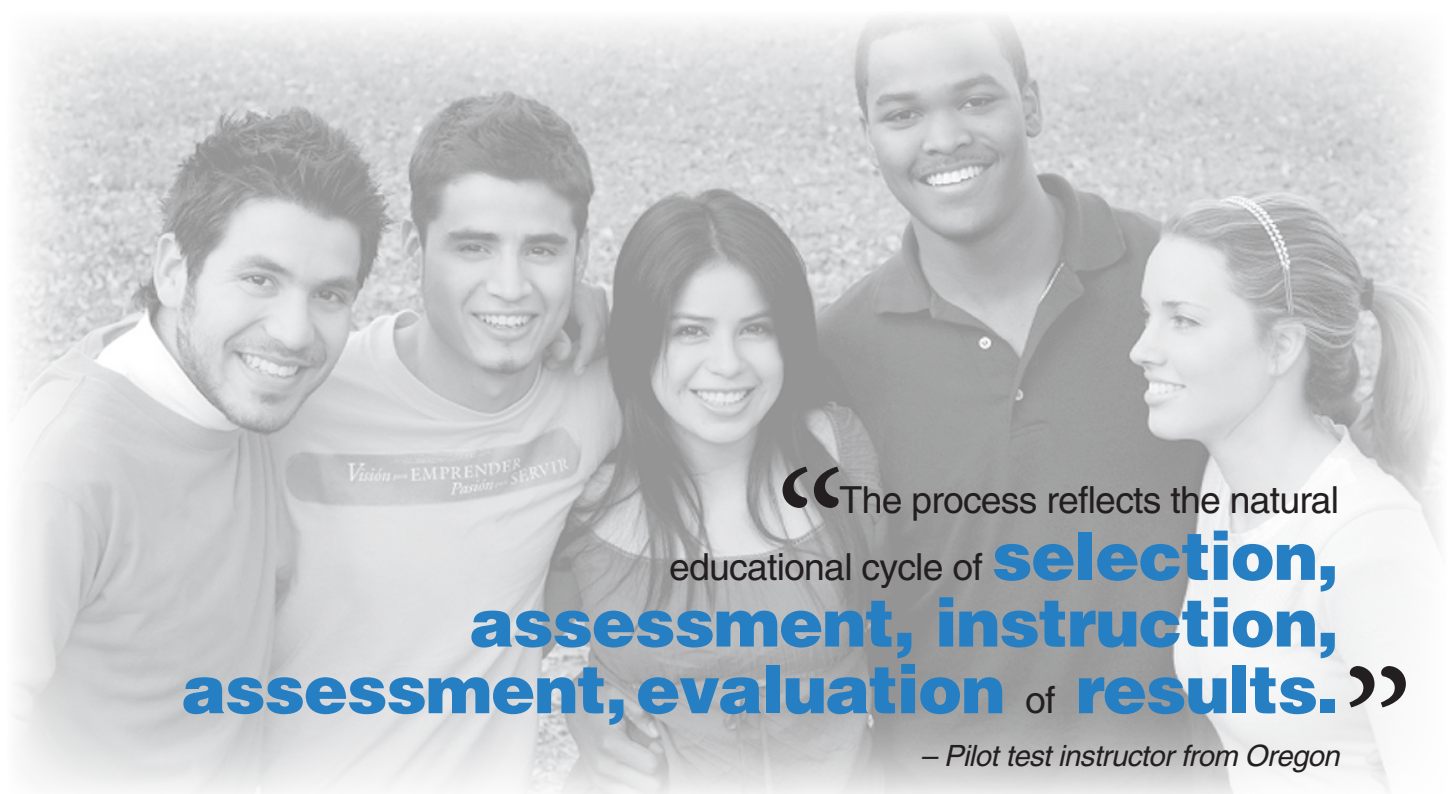
<sup>2</sup> Links™ Independence Scoring Scale: 0=Did not complete with any form of prompting; 1= Continuous physical prompt; 2=Intermittent physical prompt; 3=Gesture/visual/verbal prompt; 4= Independent



In terms of instruction, teachers indicated that the Links Lessons were clearly connected to the Links Routines and the routines were presented in a way to be easily generalized across settings. Instructors also found that the instructional guidance integrated into the Links Curriculum helped them develop a scope and sequence for instruction. Finally, instructors indicated that the supplementary materials for lesson implementation (e.g. visuals, data forms, token boards) were a major asset and increased their efficiency and effectiveness in the classroom. A sampling of pilot test participant feedback is listed in Table 6.

Table 6.  
Links Curriculum Pilot Test Feedback From Instructors

Links Curriculum (as a whole)	Links Online	Links School and Community
“The process reflects the natural educational cycle of selection, assessment, instruction, assessment, evaluation of results.”	“Great way to manage data and view/share/analyze results.”	“I like how lessons are organized sequentially and/or by curriculum area.”
“Way to go Links team! This is an incredible curriculum and online system! It clarifies and simplifies the process of teaching functional routines! It provides structure, data management, cue selection guidance, and instructional support. Links has already impacted the way I perceive teaching and assessing routines!”	“Easy to identify target areas based on data points.”	“Links provides instructors with ideas and support for how to best assess and collect data on behavior within the context of routines.”
	“Cues and expected behavior are clearly indicated for each step.”	“Lesson Format: Goals are so clear and can be used as IEP goals.”
	“Easy to use.”	“Lesson format: Easy to access for quick set up and implementation.”
“Data form is clear and easy to use.”		
“Very easy to implement quickly and effectively.”	“Easy to use.”	“Token boards are beautiful! Best ones I have ever seen.”
“It gives instructors incredible structure Links is very clear and easy.”		



“The process reflects the natural educational cycle of **selection, assessment, instruction, assessment, evaluation of results.**”

– Pilot test instructor from Oregon