

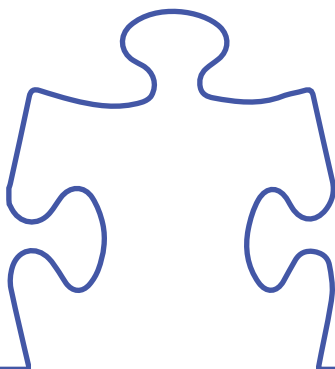
Research Study: Strategies for Effective Career and Life Education for Individuals with Autism and Other Developmental Disabilities

EVIDENCE-BASED TEACHING STRATEGIES YIELD POSITIVE OUTCOMES

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Research Study: Strategies for Effective Career and Life Education for Individuals with Autism and Other Developmental Disabilities

A Special Needs and Alternative Education Resource

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Abstract

A beta test was conducted on two Adapted kits in the *Project Discovery Adapted Curriculum: Career and Life Education for Individuals with Autism and Other Developmental Disabilities: Childcare and Table Service*. Thirty-eight participants across six sites in three states participated in the beta test for Childcare. Fifty-one participants across eight sites in three states participated in the beta test for Table Service. Increases in knowledge and skills in the career exploration activities within each kit were noted across all sites. Curriculum components, implications for practitioners, and directions for future work are discussed.

Introduction

Education Associates (EAI) has been providing proven programs and practices in the areas of career education and life skills for over 36 years. Their *Project Discovery* program provides hands-on career education experiences to help students with special needs to discover their career passions and interests, help them make better informed decisions for postsecondary success and to move toward independent living.

In 2008 an Adapted version of the curriculum was developed for students with severe, profound and moderate intellectual disabilities. These versions were designed to increase students' knowledge of career areas and increase their functional performance of career-ready tasks.

Seventeen of 54 titles were designed with Adapted versions to help students with more severe challenges to have hands-on career experiences and learn about their passions and interests. This Adapted component of the *Project Discovery* program has been extremely successful in schools across the nation. In working with administrators, teachers and Advisory board members, Education Associates desired to make the program even more robust to address additional challenges of students with autism and other developmental disabilities.

EAI contracted with Dr. Amy Spriggs of the University of Kentucky to evaluate the current Adapted program and recommend and design additional evidence-based strategies and components to support students with autism and other developmental disabilities.

Curriculum Components

In 2015, the Adapted version of the *Project Discovery* curriculum was revised to include components to make the curriculum more rigorous and more appropriate for students with autism and other developmental disabilities. Although many of the strategies were designed with individuals with autism in mind (e.g., video models, visual schedules), the strategies are appropriate to use with students of all ability levels.

The curriculum modifications included:

- 1) Evidence-based practices with directions for how to use each (e.g., video modeling, visual schedules, systematic instructional procedures);
- 2) Supports for various learners (e.g., differentiation of materials, activities to promote social communication);
- 3) Supports for teachers (e.g., curriculum complete with materials; progress monitoring procedures); and
- 4) Re-writing activities in various kits to include a larger, more rigorous scope and sequence, when appropriate.

1. Evidence-Based Practices

There were several evidence-based practices added to the original Adapted curriculum. These strategies have been established thru peer reviewed research as effective for individuals with autism and other developmental disabilities. Each kit in the *Project Discovery* Adapted curriculum includes video models, visual supports, and systematic instructional procedures.

A. Video Modeling. Video modeling is a strategy in which an individual watches a recorded demonstration of a skill being performed and then attempts to complete the skill independently. The video should capture the critical aspects of each step within a chained task. Videos are a consistent way to demonstrate a skill being performed as they are the same each time they are viewed. Video modeling is evidence-based for teaching social and functional skills (Ayres & Langone, 2005); it is also effective for addressing several stages of learning (i.e., acquisition, maintenance, generalization; Bellini & Akullian, 2007).

Video modeling is particularly effective for individuals with autism and other developmental disabilities due to the visual nature and reliable model. Video models promote independence by allowing individuals to rely on a prompt other than a person. They help the student with social and behavior skills by allowing the student to know exactly what is expected in any given activity.

B. Visual Schedules and Other Visual Supports. Visual supports are important for students with autism and other developmental disabilities. Visual supports can include anything that provides a prompt that is taken in through the eyes, as opposed to a verbal prompt taken in through the ears. Communication skills, behavior, and increased independence are skills that are enhanced when using visual supports with individuals with autism (Quill, 1995) and other intellectual disabilities (Spriggs, Mimms, vanDijk, & Knight, 2016). Visual schedules are a strategy where skills within a chained task (e.g., setting the table) are depicted visually, most often thru a series of pictures. Visual schedules are evidence-based for both individuals with autism (Knight, Sartini, & Spriggs, 2014) and intellectual disability (Spriggs et al., 2016). Visual schedules can increase time on-task, time on-schedule, and independent transitions within activities.

Like video models, visual schedules are particularly effective for individuals with autism and other developmental disabilities because of their visual nature and simplistic depiction of the various steps required to complete a whole task. Visual schedules also promote independence by allowing individuals to rely on a prompt other than a person. They help the individual with social and behavior skills by allowing the individual to know exactly what is expected in any given activity.

C. Systematic instruction. Systematic instruction includes a structured approach to teaching where stimulus or response prompts are embedded into instruction to elicit near errorless learning (Collins, 2012). The prompts used during instruction are determined prior to teaching and based on both the skill being taught and the learner's ability to follow adult prompts. Two specific systematic instructional procedures that have been effective in teaching students with autism and other developmental disabilities are constant time delay and system of least prompts.

Constant time delay. Constant time delay is commonly used to teach discrete behaviors (i.e., behaviors with a specific beginning and end such as teaching vocabulary words). Constant time delay is a response prompting procedure that can be considered a near errorless strategy (Collins, 2012). Trials typically begin with a 0-second delay, where the teacher presents the stimulus (e.g., vocabulary word), provides the task direction (e.g., "What word?") and immediately provides the prompt (e.g., teacher says, "napkin"). This 0-second delay can last one or more sessions, until the student responds correctly to all stimuli after the teacher prompt. Then the delay interval is increased to a "constant" amount, typically 3 or 5 seconds. The delay interval depends on the student's ability to wait and time needed to process.

System of least prompts. System of least prompts is commonly used to teach chained behaviors (i.e., behaviors with more than one step such as setting the table). System of least prompts also is a response prompting procedure that can be considered a near errorless strategy (Collins, 2012). The chained task is broken into single steps and students are guided through a prompt hierarchy, ending with a prompt that will ensure the step in the task is performed.

Typically, prompts include:

Independent Prompts. The individual is given the opportunity to perform the step independently (e.g., the student places the plate on the placemat)

Gesture Prompts. The instructor gestures toward the materials (e.g., the teacher points to the plate and then points to the placemat)

Auditory/Verbal Prompts. Include the teacher stating the task to be performed (e.g., the teacher says "put the plate on the placemat.")

Visual/Picture Prompts. Includes the teacher showing the individual a picture of the step to be completed (e.g., the teacher points to a picture in the visual schedule showing the plate on the placemat)

Model Prompts. The instructor shows the student what to do (e.g., the teacher places the plate on the placemat)

Partial Physical Prompts. Includes the teacher using a small amount of physical support to help the student complete the step (e.g., the teacher guides the student's arm toward the plate by moving their arm at the elbow)

Full Physical Prompts. Typically the prompt used to ensure the step is completed by the student since the teacher is providing hand-over-hand assistance to complete the step (e.g., the teacher places her hand over the learner's hand to help grasp the plate and then guides their arm to the placemat and releases the learner's hand when it is over the placemat).

Teachers should allow individuals a set amount of time to initiate each step (e.g., 5 seconds) and a set amount of time to complete each step. The amount of time to initiate and complete steps will vary depending on student ability and the task being completed.

2. Supports for Various Learners

In addition to the evidence-based practices, the *Project Discovery Adapted Curriculum* includes several components designed to meet the needs of a diverse group of learners with disabilities. The curriculum includes materials that are easily adapted for differentiation; teachers can modify the materials, if necessary, to provide as little or as much support as their students need. The curriculum was designed to meet the needs of those with social communication and behavior delays often associated with autism and other developmental disabilities. In addition, the student assessments were designed to mimic the multiple choice test format of the alternate assessment for many states.

A. Differentiated Instruction. The curriculum was planned using core Universal Design for Learning principles. Each kit includes activities that utilize multiple means of representation, allow for multiple means of expression, and offer multiple means of engagement (Edyburn, 2005). When a curriculum is designed using Universal Design for Learning principals, the access to various learners is increased.

Providing multiple means of representation means that the curriculum can be presented in various ways (e.g., video models, live models, pictures, audio supports).

Allowing for multiple means of expression means that students can show mastery in various ways. This could include saying an answer, pointing to a picture, or completing a hands-on task with a finished product.

Offering multiple means of engagement means that activities vary with materials and types of activities (e.g., hands-on activities, video models, worksheets). It is the multiple means of engagement that should keep students engaged and wanting to learn. Teachers can offer all or some of the means of representation, expression and engagement to meet the needs of the specific learners.

B. Social Communication and Behavioral Supports. Common areas of need for individuals with autism and other developmental disabilities is social communication and behavior. Social communication refers to the verbal and nonverbal behaviors used during social exchanges (Wetherby, Watt, Morgan, & Shumway, 2006). When teaching individuals with social communication deficits, it is important to provide ways for them to communicate in their particular mode of communication (e.g., pictures, words, communication device). It is equally important to provide opportunities to practice these skills (e.g., taking someone's order, placing an order at a restaurant).

Behavior can refer to many things in children with autism and other developmental disabilities. Adherence to routines and aberrant behaviors are two that most often interfere with learning. Since many behaviors occur because of deficits in communication, providing multiple means of expression is crucial (Durand & Moskowitz, 2015).

Creating a curriculum that has a predictable order of implementation and visual supports (e.g., pictures, visual schedules) to depict the differences within it will likely help increase appropriate behaviors while decreasing inappropriate behaviors (Knight, Sartini, & Spriggs, 2015; Spriggs, Mims, vanDijk, & Knight, 2016).

3. Supports for Teachers

In addition to the supports in place for students, there needs to be supports in place for teachers to implement any given curriculum with ease. Providing all the necessary materials with directions for use is the first step. All materials include directions, tests, progress monitoring directions and data collection sheets, activity templates, materials to complete each activity, etc. Including multiple variations of each component is also helpful.

Often teachers will use what is provided to them because planning time is limited; providing the variations as opposed to suggesting them will increase the likelihood the teacher will use the strategies that are most beneficial to the students exploring the curriculum.

In addition, providing a means for additional modifications is needed to keep the curriculum in line with the Universal Design for Learning principles. For example, providing a digital copy of the materials ensures the teacher has the capability to modify curriculum components further, as needed, for each student's means of representation, expression, or engagement.

Additional Modifications. Additional modifications to the curriculum were made to increase the rigor of the existing curriculum. Activities were rewritten to include a more thorough scope and sequence and align to additional standards. Audio files were added to the student instructions. The pre- and post-tests were rewritten to include a choice of four, which aligned to the Kentucky alternate assessment format.

Purpose of Beta Testing

The purpose of this beta testing was to determine if the adaptations made to the Adapted curriculum for Project Discovery increased the knowledge and skills in specific career areas for adolescents and young adults with autism and other developmental disabilities. Specifically, this beta test targeted two kits: Childcare and Table Service.

Beta Test Method

Participants

Participants included students with autism and other developmental disabilities from eight school districts across three states. For Childcare, there were 40 participants, ages 14 to 21 that participated. Table Service was completed by 51 participants, ages 11 to 21 that participated. Twenty-eight participants completed both the Childcare and Table Service kits. The majority of the participants had intellectual disability and/or autism. Table 1 below and Tables 1-8 in Appendix A outline the participants by site.

Table 1. Beta site information.

	Site	Location	Childcare (N)	Table Service (N)
1	Clark County Public Schools	Rural Kentucky	7	7
2	Fayette County Public Schools	Urban Kentucky	3	5
3	Nelson County Public Schools	Rural Kentucky	11	11
4	Woodford County Public Schools	Rural Kentucky	4	5
5	Mahtomedi Public Schools	Minnesota	N/A	5
6	Osseo Public Schools	Minnesota	5	5
7	Oshkosh Public Schools	Wisconsin	8*	8*
8	Beaver Dam Public Schools	Wisconsin	N/A	5*
		Total N:	38	51

*The data for these sites only included pre/post-test data

Beta Test Method

Settings

Beta testing occurred in eight public schools across three different states. Table 2 outlines setting characteristics for each site.

Table 2. Setting descriptions

Site	Description
Clark County Public Schools, Kentucky	Clark County is a school district located in rural Kentucky that educates over 5,000 students; 12.4% have disabilities. The beta tests occurred in a self-contained classroom for students with moderate to severe disabilities.
Fayette County Public Schools, Kentucky	Fayette County is a school district located in urban Kentucky that educates over 40,000 students; 10.8% have disabilities. The beta tests occurred in a self-contained classroom for students with moderate to severe disabilities.
Nelson County Public Schools, Kentucky	Nelson County is a school district located in rural Kentucky that educates almost 5,000 students; 13.9% qualify for special education services. The beta tests occurred in a self-contained classroom for students with moderate to severe disabilities.
Woodford County Public Schools, Kentucky	Woodford County is a school district located in rural Kentucky that educates a little over 4,000 students; 11% have disabilities. The beta tests occurred in a self-contained classroom for students with moderate to severe disabilities.
Mahtomedi Public Schools, Minnesota	Mahtomedi school district is a small district located in Mahtomedi, Minnesota, 15 miles northeast of St. Paul. It educates 3,315 students; 10% have disabilities. The beta tests occurred in a resource classroom for students with disabilities.
Osseo Public Schools, Minnesota	Osseo area schools are located in Maple Grove, Minnesota, a large urban school district. The school district educates 20,511 students; 13.9% of those students have disabilities. The beta tests occurred in a self-contained special education classroom.
Oshkosh Public Schools, Wisconsin	Oshkosh area schools are located in Oshkosh, Wisconsin, educating approximately 10,000 students. 15% of the students have disabilities. The beta tests occurred in a self-contained special education classroom.
Beaver Dam Public Schools, Wisconsin	Beaver Dam Unified School District educates 3642 students in Beaver Dam, Wisconsin. 12.9% of the students receive special education services. The beta tests occurred in a self-contained special education classroom.

Materials and Equipment

The materials used during beta testing included the *Project Discovery* Adapted Childcare and Adapted Table Service kits. Both kits included all materials needed to complete activities and instructional materials. The instructional materials included an outline for: suggested order of implementation, data collection procedures, curriculum components (e.g., First Look, student instructions, video models, visual schedules, datasheets), teaching strategies (i.e., system of least prompts and constant time delay), introductory activities, and online resources. The instructional materials also included teacher instructions, datasheets, visual schedules, student instructions, supplemental worksheets, and video models for each activity.

Additional resources in the instructional materials included a scope and sequence, interactive pre/post-test, optional lesson plans for community based instruction extensions of the skill learned, social stories for the community based instruction trips, follow-up activities for after the trips, and digital files that contained the video models and digital materials to complete each kit. Examples of instructional materials can be found in Appendix B.

Childcare. The Childcare kit included seven activities:

- 1) Lifting and Carrying the Baby
- 2) Feeding the Baby
- 3) Diapering the Baby
- 4) Dressing the Baby
- 5) Sponge-Bathing the Baby
- 6) Tub-Bathing the Baby
- 7) Swaddling the Baby

There were optional activities embedded throughout the kit for teachers to consider using (e.g., supplemental worksheets, role plays, situation cards).

Table service. The Table Service kit included three activities:

- 1) Setting a Table
- 2) Taking an Order
- 3) Bussing a Table.

There were optional activities embedded throughout the kit for teachers to consider using (e.g., supplemental worksheets, Bingo game, board game).

*There were three optional **extension activities** included in the Table Service Kit:*

- 1) Setting a Table for Breakfast
- 2) Taking an Order for Lunch
- 3) Bussing a Table for Dinner.

These extension activities were designed for students to be able to reverse the roles of the "waiter" and "customer."

Data Collection

Teachers were asked to collect data on a variety of measures.

- 1) Pre and post-test data were collected on general knowledge of each topic (i.e., Childcare, Table Service). Students were shown an interactive test using a PowerPoint with audio. Each question had a choice of four answers (this format was used to simulate the test questions and answers they would see on the Kentucky Alternate Assessment test). Teachers recorded student answers as correct or incorrect on the pre/post-test data collection sheet provided in the kit.

2) Teachers also collected data on skill development of each activity using System of Least Prompts, each time they completed the activity. Datasheets were included with each activity and included a task analysis of the steps need to complete each. See the Teacher data collection section #5 (pg. 12) for detailed data collection procedures during the activities.

Procedures

Teacher Training Teachers were trained by Dr. Spriggs, who walked each site thru the instructional materials they started with (e.g., Nelson County Public Schools in Kentucky started with Childcare). Teachers were encouraged to make notes about the instructional materials and to ask questions as they had them. An outline of the order of procedures was provided. Teachers were observed by Dr. Spriggs implementing lessons to ensure they were including all necessary components. Dr. Spriggs monitored the sites, at least weekly, to ensure progress was being made and to answer any questions.

Pre/Post Career Assessment Inventory Prior to beginning instruction on either of the kits, participants were given a specially designed pre-career assessment inventory. Once participants completed both kits, the same assessment was given again. The pre-career assessment inventory included a series of questions asking students to circle jobs they would like, given a choice of three (e.g., childcare worker, waiter/waitress, mailroom worker). It also included a series of questions asking if the student would like to do certain work (e.g., "I would like to work in a pet shop").

Introductory Activities Each hands-on career kit included background knowledge activities, worksheets, and vocabulary boards and cards to introduce the concepts to be covered in each kit. Examples of introductory activities included daily living skills such as washing hands, cleaning surfaces, putting on gloves, etc. These activities were often required as steps in the various activities in the kit and allowed the students to learn how to perform some of these skills before beginning the kit. Worksheets targeted basic skills on different levels (e.g., matching picture to picture, matching definition to picture). Each kit included key vocabulary in the form of real pictures on vocabulary boards. Teachers were provided with the digital files for individualization, if desired (e.g., uploading to a communication device, enlarging, providing fewer choices). Teachers were instructed to use constant time delay to teach the vocabulary to students prior to beginning the activities in the kit.

Pre/Post-Test Prior to beginning instruction on each kit (i.e., Childcare, Table Service), students completed a pre-test. The pre-test was comprised of 10 multiple-choice questions relating to skills and vocabulary covered in the activities of each kit (e.g., When you dress a baby, what do you put on first?). Each question had a choice of four answers to mirror the Alternate Assessment test format in Kentucky (e.g., A. booties, B. diaper, C. blanket, D. shirt). Once all activities in a kit had been completed, the same test was given again as the post-test.

Kit Activities Participants completed all activities in the kit (seven activities for Childcare and three activities for Table Service). The sequence for implementation for both kits included: 1) First Look PowerPoint, 2) Student Instructions PowerPoint, 3) video model, 4) teacher model, and 5) student demonstration using visual schedule with teacher data collection.

Teachers were instructed to follow this sequence for the first attempt at each activity; teachers were given freedom in which components they used for all subsequent sessions within each activity. Activities were repeated until the majority of the class (i.e., at least 50% students) had mastered the activity with 100% steps completed independently.

The student instructions, video model, and visual schedule were all identical in the order of the steps, the wording of the steps, and the pictures used. All pictures were streamlined throughout the curriculum (i.e., the pictures used were taken from video model clips or photographs of the materials in each kit). Each kit included all components in digital formats for each teacher to use as needed (e.g., importing pictures into a communication device, printing pictures larger, printing pages of vocabulary with more or less choices). To maximize the use of technology, digital formats including Word, PDF, and PowerPoint were included.

- 1) First Look.** The First Look component was a PowerPoint with audio which introduced the participating students to the key vocabulary and concepts to be covered in each activity within the kit. Teachers were instructed to allow students to view the First Look prior to beginning any activity. The First Look began with key vocabulary and an introduction to Activity 1; there was a prompt to "stop and complete Activity 1." After students mastered Activity 1, they could view the First Look starting with Activity 2. This continued until all activities had been completed.
- 2) Student Instructions PowerPoint.** Each activity in the kit included a "Student Instructions" PowerPoint. These instructions could be viewed on a computer or interactive whiteboard using PowerPoint. The books were designed to walk students thru each step in the activities to be completed in the kit. Each slide included audio supports so the students could see a visual (i.e., picture) and hear a verbal direction for each step in the activity. For students not needing the audio support, teachers could print the slides and create a book for students to read or turn the audio component off. Teachers were instructed to have students go thru the Student Instructions after the First Look for each activity in the kit.
- 3) Video Model.** Video models of each activity in the kits were professionally created to follow the student instructions. The videos captured an adult model performing each step of the activity using the materials found in the kit. Each step in the task analysis of each activity was narrated to match the skill being performed. Videos were shown in their entirety after students viewed the Student Instructions.

4) Teacher Model. Teachers were instructed to use the materials in the kit to model each activity for students after they watched the video model. The teacher model followed the Student Instructions and Video Model exactly. This live model was used to reinforce the skills viewed in the Student Instructions and the video model, using the materials students were going to be using.

5) Student demonstration using visual schedule with teacher data collection. Students were provided a visual schedule of each activity and provided a task direction to complete the activity (e.g., "set the table"). The visual schedules matched the Student Instructions and video model (same sequence of events, same pictures, etc.). Students were able to mark off each step as they completed them, if they wanted to. At the end of the activity, when all steps had been completed, students were instructed to answer two questions: "How did I do?" and "Did you like {insert activity}?" Teachers recorded the answers to these two questions on the datasheets.

Students were given the visual schedules to complete each activity in the kits. If students were able to complete the skills using the visual schedules, it was considered independent. If a student could not complete a step using the visual schedule, a system of least prompts was introduced.

The prompts hierarchy included:

I=independent

G=gesture

A=auditory/verbal

V=visual/picture

M=model

PP=partial physical

FP=full physical

Teachers were instructed to provide the prompts in the order listed and to record the level of prompt for each step in the task analysis onto the activity's datasheet.

Independent. If a student could complete a step using the visual schedule, an "I" for independent was recorded.

Gesture. If a student did not complete a step independently, a gesture was used and a "G" was recorded on the datasheet. A gesture included things like pointing toward the needed materials.

Auditory/Verbal. If a gesture did not elicit a correct response, the teacher provided an auditory/verbal prompt where the student was told what to do and an "A" was recorded.

Visual/Picture. If the auditory/verbal prompt was not successful, the teacher showed the student a picture or pointed to the picture on the visual schedule and recorded a "V" for visual prompt on the datasheet.

Model. A model prompt followed a visual prompt; the teacher modeled completion of the step and an “M” was recorded on the datasheet.

Partial Physical. If a model was unsuccessful, a partial physical prompt was used where the teacher provided light physical guidance to complete the step. If the student was able to complete the step, a “PP” was recorded.

Full Physical. The last step in the prompt hierarchy was a full physical prompt where the teacher used hand-over-hand prompting to ensure the step was completed correctly. If this level of prompting was required, an “FP” was recorded.

To determine each student’s level of independence, each prompt level was assigned a score: I=6; G=5; A=4; V=3; M=2; PP=1; FP=0

Scores were totaled and used to determine the level of independence with which each activity was completed. An example datasheet with scores can be found in Appendix B.

Social Validity

At student completion, teachers and other stakeholders (paraprofessionals, peer tutors) that observed the curriculum being implemented were asked to rate a series of statements using a Likert rating (1-5) related to the curriculum, perceived outcomes, and future implications.

There were 15 questions. Ratings ranged from 1 “Strongly Disagree” to 5 “Strongly Agree.” The list of questions can be seen in Table 3 below in the Results section.

Beta Test Results

Data were collected on student knowledge acquisition through pre/post-test data. Data were collected on skill development and trials to criterion for students mastering the activities during activity training, where data were collected each time students were instructed to complete the activity.

Pre/Post-test

The pre/post-test for Childcare was successfully completed by 38 students in six different sites across three states. The results for each site were averaged. The results of the pre/post-test for Childcare are illustrated in Figure 1. The average pre-test score across all participants was 5.8. The average post-test score across all participants was 7.7. The average percent increase across all students and sites was 61.7% (range 17.7-183.1 by site).

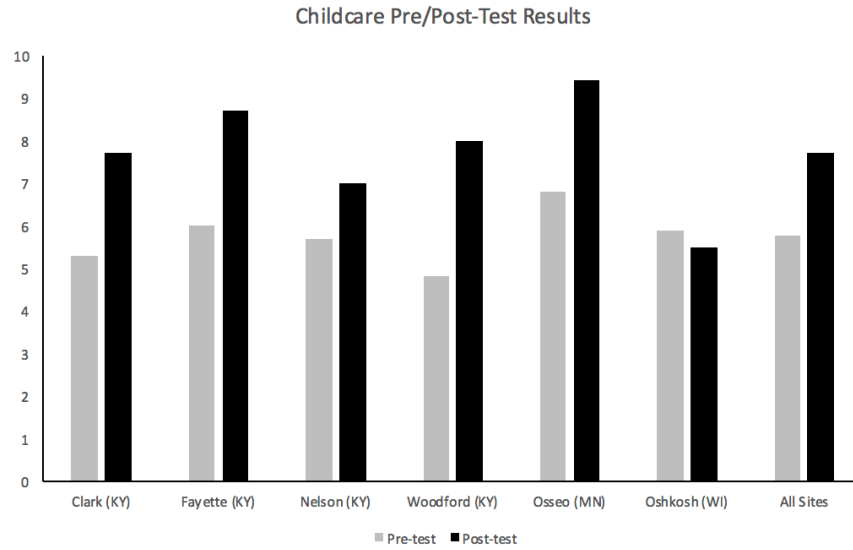


Figure 1. Pre/post-test data for Childcare

The pre/post-test for Table Service was successfully completed by 49 students. The results for each site were averaged. The results of the pre/post-test for Table Service are illustrated in Figure 2. The average pre-test score across all participants was 5.6. The average post-test score across all participants was 7.3. The average percent increase across all students and sites was 55.3% (range 12.2-227.8 by site).

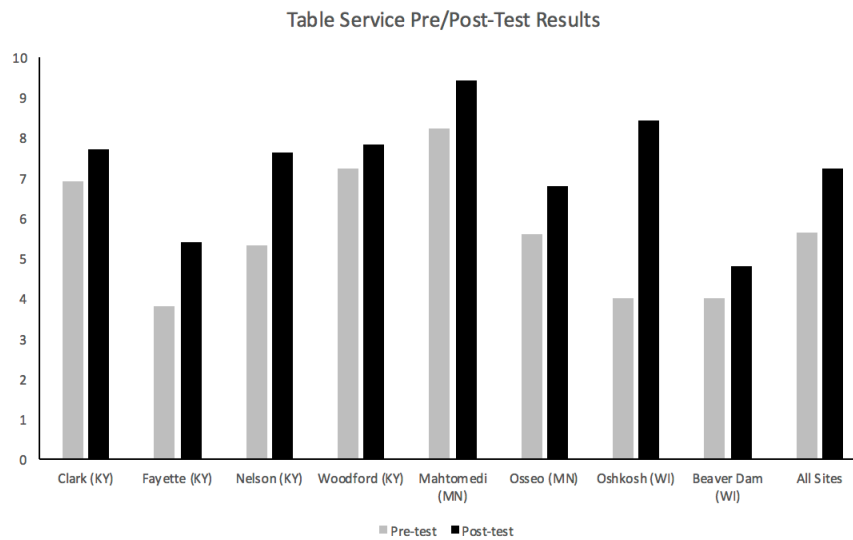


Figure 2. Pre/post-test data for Table Service.

Activity Training

Thirty-eight students successfully completed each activity in the Childcare kit; individual activity data were reported for 30. Data were collected on how independently each step in each task analysis was performed for each student. To determine amount of growth in each activity, each student's first score on the task analysis was compared to the last score on the task analysis (i.e., if a student received instruction on an activity for four days, the first day was compared to the fourth day, regardless of mastery). These data were aggregated for each activity for each site. The results for activity growth are illustrated in Figures 3-9 below.

Each site had growth from the first lesson to the last lesson across all kits.

In addition, the number of sessions required to master each activity was recorded for students who reached criterion (i.e., 100% steps completed independently in any activity). The average number of sessions to criterion across activities in Childcare was 2.4 sessions.

In Activity 1, Lifting and Carrying the Baby, 16 students mastered all steps in the task. Their average sessions to criterion was 3.2.

Nine students mastered Activity 2, Feeding the Baby, with an average of 3 sessions to criterion.

Activity 3, Diapering the Baby was mastered by 19 students. Their average sessions to criterion was 2.6.

Eighteen students mastered Activity 4, Dressing the Baby, with an average of 1.8 sessions to criterion.

Twelve students mastered Activity 5, Sponge-Bathing the Baby, in an average of 1.8 sessions.

Tub-Bathing the Baby, Activity 6, was mastered in an average of 1.9 sessions by 15 students.

The last activity, Swaddling the Baby, took an average of 2.5 sessions to master by the 18 students who mastered it.

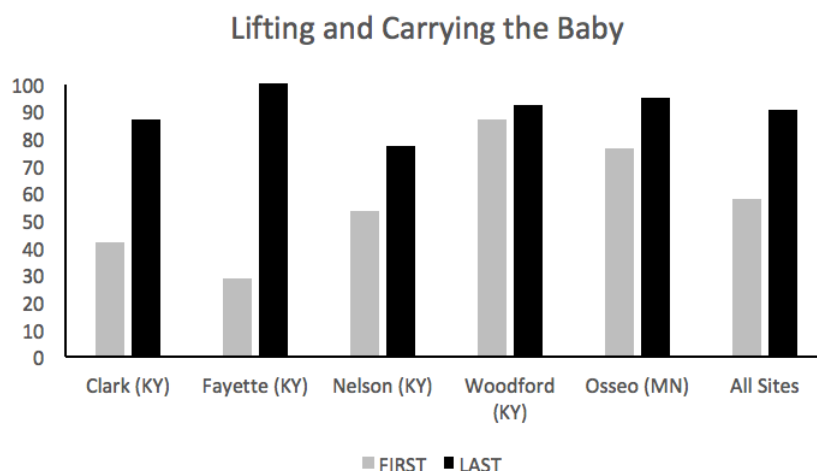


Figure 3. Growth for Childcare Activity 1: Lifting and Carrying a Baby

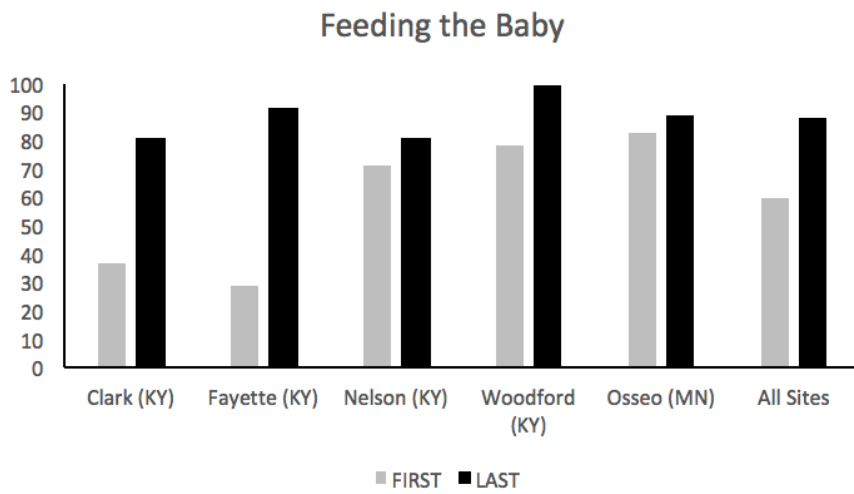


Figure 4: Growth for Childcare Activity 2: Feeding the Baby

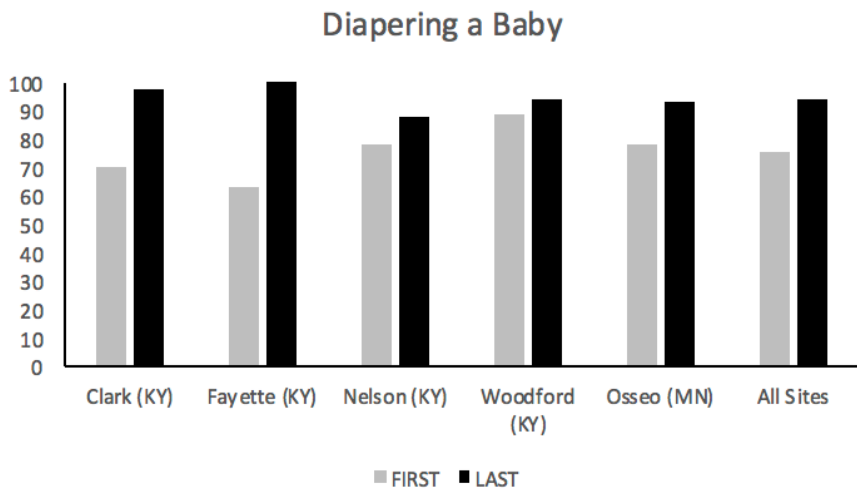


Figure 5: Growth for Childcare Activity 3: Diapering a Baby

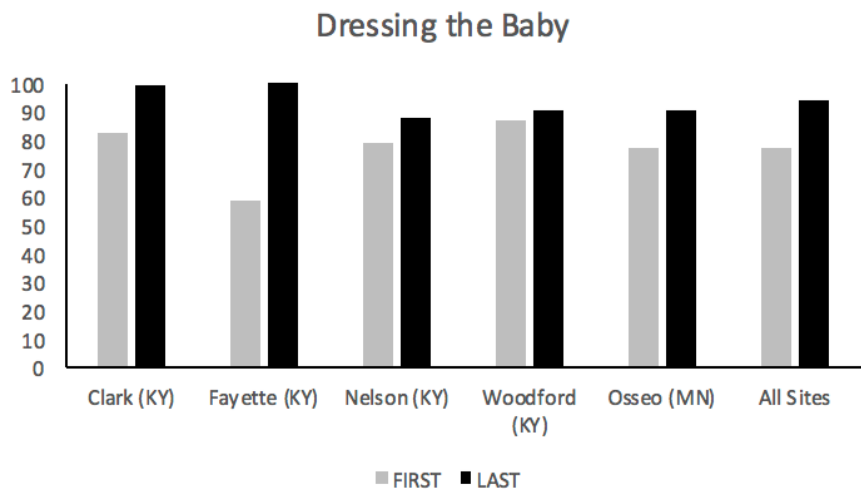


Figure 6: Growth for Childcare Activity 4: Dressing the Baby

Sponge-Bathing the Baby

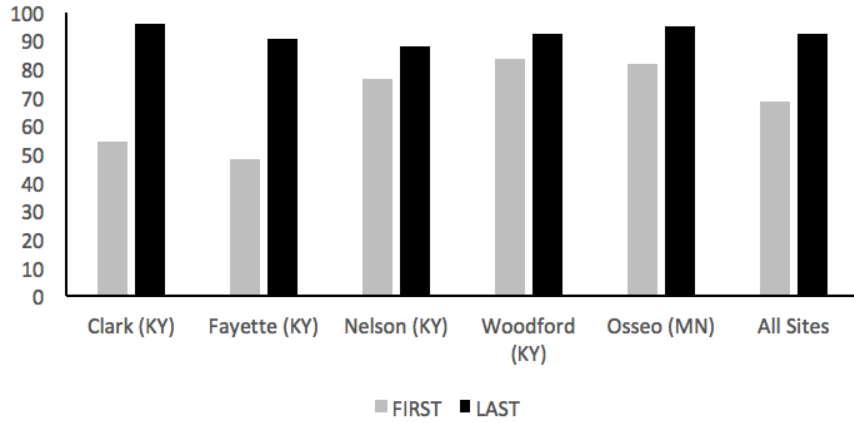


Figure 7: Growth for Childcare Activity 5: Sponge-Bathing the Baby

Tub-Bathing the Baby

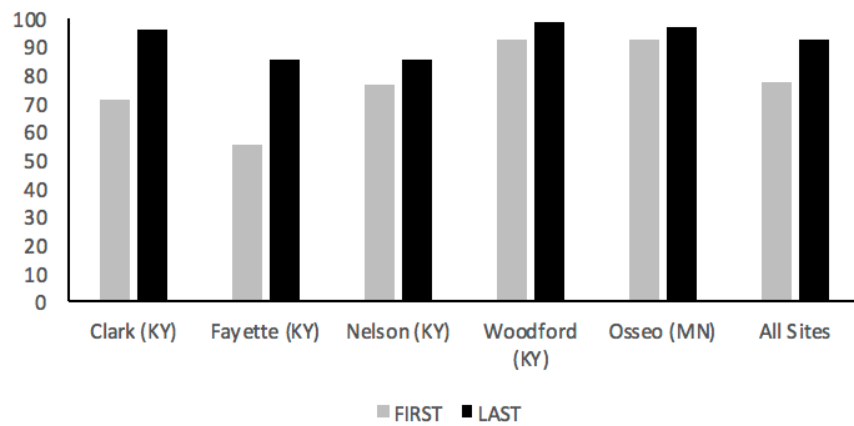


Figure 8: Growth for Childcare Activity 6: Tub-Bathing the Baby

Swaddling the Baby

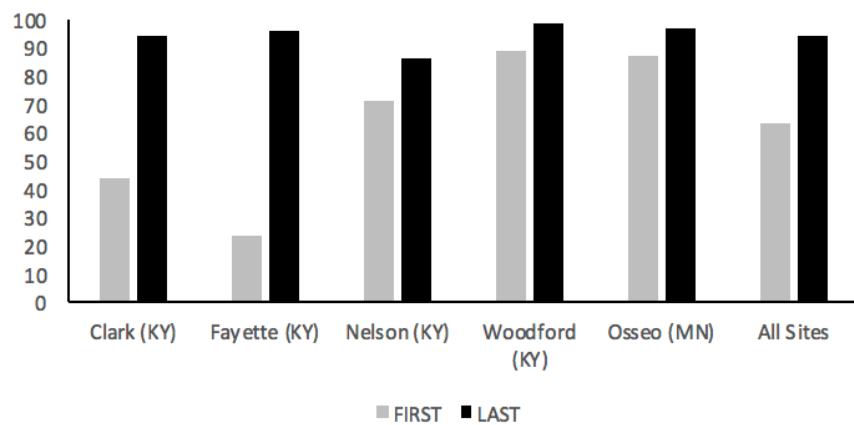


Figure 9: Growth for Childcare Activity 7: Swaddling the Baby

Fifty-one students completed the activities in the Table Service kit; individual activity data were reported for 38. Data collection for activity growth in Table Service was collected identical to Childcare. The results for activity growth in this kit are illustrated in Figures 10-12 below.

Each site had growth from the first lesson to the last lesson across all activities.

In addition, the number of sessions required to master each activity was recorded for students who reached criterion (i.e., 100% steps completed independently in any activity). The average number of sessions to criterion across activities in Table Service was 2.6 sessions.

In Activity 1, Setting the Table, 31 students mastered the skills in an average of 2.4 sessions.

Activity 2, Taking an Order, was mastered by 18 students in an average of 2.7 sessions.

Twenty-eight students mastered Activity 3, Busing a table, in an average of 2.6 sessions.

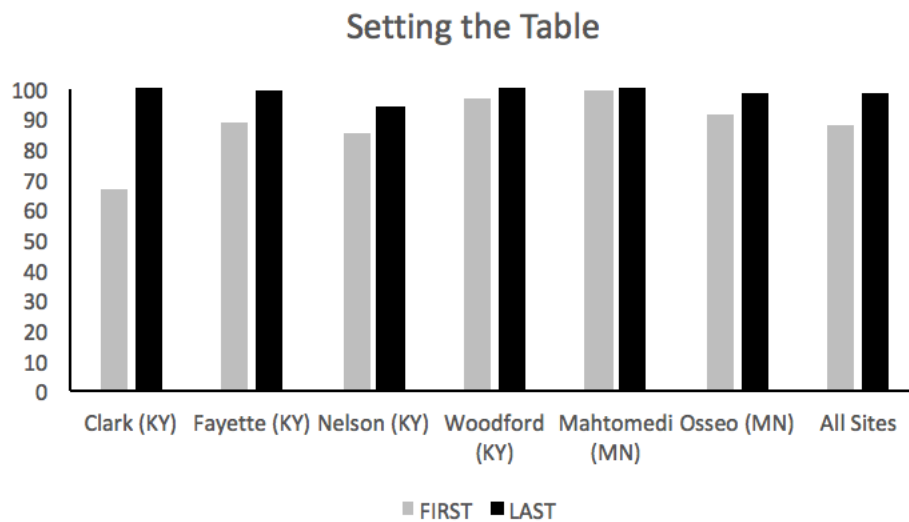


Figure 10: Growth for Table Service Activity 1: Setting the Table

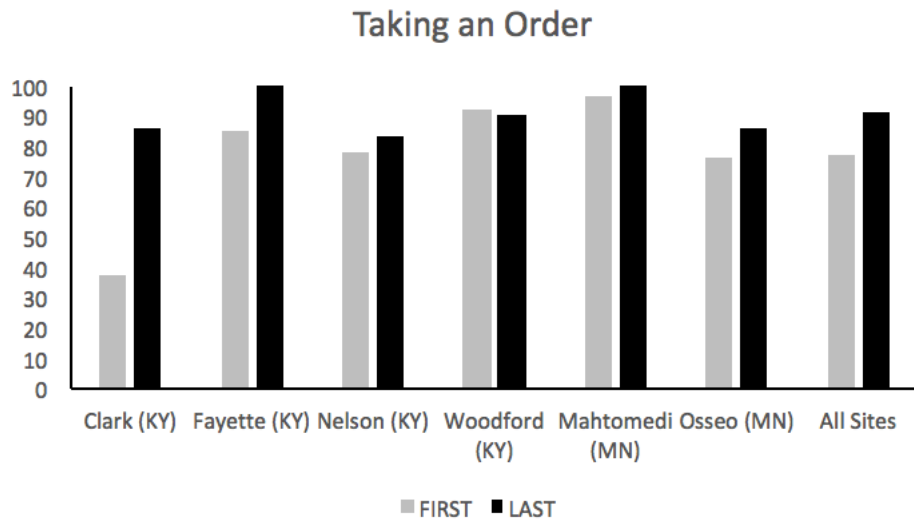


Figure 11: Growth for Table Service Activity 2: Taking an Order

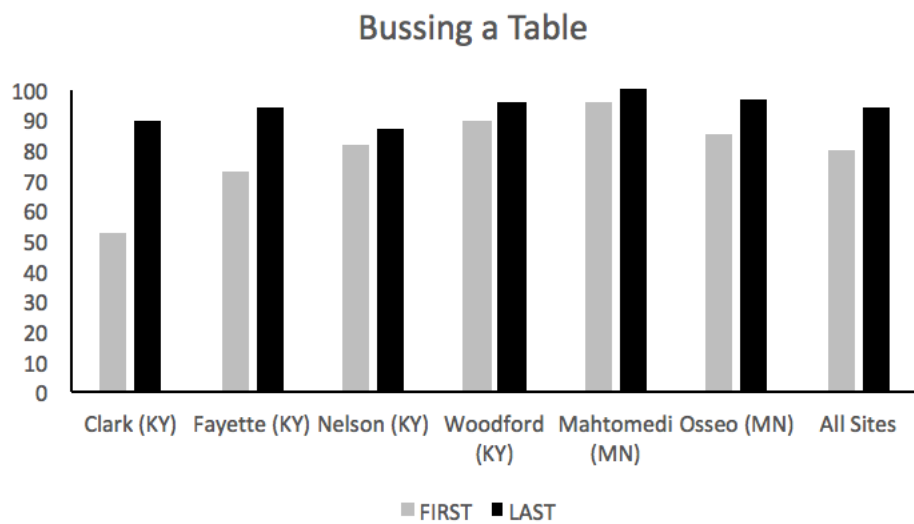


Figure 12: Growth for Table Service Activity 3: Bussing the Table

Social Validity

Social validity scores were obtained by the 4 sites in Kentucky. The data were aggregated into means and ranges to maintain confidentiality. The results are reported in Table 3 below.

Table 3. Social Validity Questionnaire Results

Question	Teacher N=5	IA N=8	Peer N=7
It is important for students with disabilities to be taught specific career skills before graduating from high school.	M: 5 R: 5	M: 4.75 R: 4-5	M: 4.71 R: 4-5
Using the Adapted curriculum designed by Project Discovery, I was able to teach my students specific career skills.	M: 4.4 R: 3-5	M: 3.88 R: 3-4	M: 4.57 R: 4-5
The adaptations made to the curriculum were necessary for my students with disabilities to learn the specific career skills.	M: 3.8 R: 3-4	M: 4.13 R: 3-5	M: 4.57 R: 4-5
The kit materials included everything I needed to teach the career skills to my students.	M: 4.2 R: 4-5	M: 4.13 R: 2-5	M: 4.14 R: 3-5
The materials were appropriate for individuals with autism (e.g., reading levels, visual supports).	M: 3.75 R: 2-5	M: 3.83 R: 2-5	M: 4.33 R: 4-5
The curricula supports instruction in alternate assessment standards.	M: 2.8 R: 1-4	M: 3 R: 1-5	M: 3.71 R: 4-5
The instructor's materials were appropriate and useful.	M: 4.4 R: 4-5	M: 3.88 R: 3-5	M: 4.43 R: 4-5
The activities were realistic and appropriate for the job tasks of that career.	M: 3.6 R: 3-4	M: 3.63 R: 2-5	M: 4.71 R: 4-5
The visual checklists helped students evaluate their ability and interests for performing specific careers.	M: 4 R: 3-5	M: 3.75 R: 2-5	M: 4.43 R: 3-5
The video models helped students learn to perform the tasks with more independence.	M: 4.2 R: 3-5	M: 4.38 R: 4-5	M: 4.29 R: 4-5
Data sheets are an effective benchmark to record student data.	M: 4.2 R: 4-5	M: 4.43 R: 4-5	M: 4.43 R: 3-5
The activities completed in Project Discovery had a positive impact on transitions services in IEP development for students who participated.	M: 3.6 R: 2-4	M: 4.25 R: 4-5	M: 4.43 R: 3-5
My students were taught skills to obtain gainful employment after graduation (i.e., a job making at least minimum wage).	M: 4 R: 3-5	M: 4 R: 3-5	M: 4.57 R: 3-5
Students can make better informed decisions for postsecondary outcomes after using these materials.	M: 4 R: 4-5	M: 3.89 R: 3-5	M: 3.75 R: 3-5

IA = instructional assistant; M = mean; R = range

Beta Test Discussion

The purpose of this beta testing was to determine if the modifications made to the *Project Discovery* Adapted curriculum were sufficient in increasing awareness of specific careers and in teaching adolescents and young adults with autism and other developmental disabilities career ready skills. Specifically, this beta test targeted two kits: Childcare and Table Service.

Students showed growth in both the knowledge gained during the kits (assessed thru pre/post-tests) and skills acquisition for individual activities within each kit (assessed thru progress monitoring datasheets).

Since the initial 17 programs follow a defined procedure, with only the subject content changing, this beta project established the effectiveness of the new materials prior to developing the remaining titles.

Implications for Practitioners

The results of this beta test have several implications for practitioners who work with young adults with autism or other developmental disabilities. First, the *Project Discovery* curriculum is a complete curriculum. It includes all instructions and materials needed to complete the activities within each kit.

These materials include:

- *A bin with the physical materials needed to complete each activity*
- *Instructional materials which include a scope and sequence*
- *Teacher directions*
- *Student instructions*
- *Worksheets*
- *Datasheets for progress monitoring*
- *Supplemental activities*
- *A DVD with the video models and digital files of all components.*

One advantage of this curriculum is that it comes with multiple components, allowing for easy differentiation. In today's special education classrooms, teachers are faced with educating a wide range of students.

With the Project Discovery program and its approach, teachers can choose which components to use to best meet the needs of the students they are teaching.

In the beta sites, teachers were required to implement the curriculum components in the order they were “prescribed” for the first session of each activity (i.e., after the pre-test and First Look, they were to use the Student Instructions, video model, teacher model, and then the visual schedule in that order).

They were then given freedom to pick and choose which components to include after that. Some sites (e.g., Nelson County Public Schools, KY) used every single component every time they taught the activities and some sites (e.g., Woodford County Public Schools, KY) used all components the first time and then used the video model and made the visual schedules available each time. This flexibility allows for each teacher to determine the level of support specific students require to master the individual activities.

There are other pieces of the curriculum that are easily differentiated by the teacher if desired (e.g., vocabulary boards, worksheets). Digital files of all materials are provided; this allows the teacher to customize materials as needed.

The ability to make changes to the curriculum to differentiate for multiple learning needs makes this curriculum especially appropriate and effective for a variety of learners with autism and other developmental disabilities.

In addition to being a complete curriculum that can be tailored to the needs of specific students, the curriculum is designed to focus on teaching individuals with autism and other developmental disabilities career ready skills. This is a critical area to focus on in educating these individuals because the post-school employment outcomes for these students are not promising.

Individuals with disabilities are eight times less likely to be gainfully employed than those without disabilities; individuals with autism are the least likely to become employed as adults (Westbrook et al., 2013).

Participation in vocational training or job-related activities in high school can lead to better post-school outcomes for individuals with autism and other developmental disabilities (Barnett & Crippen, 2014).

Barnett and Crippen (2014) suggest several steps to creating positive school-based employment opportunities for adolescents with disabilities. Several items on their list are included within the Project Discovery Adapted curriculum.

Academic Standards. They suggest that you align your program to established standards. Project Discovery integrates academic skills into the activities and is aligned to Common Core state standards, individual state standards, and alternate assessment standards.

Connect Activities to Real Life. Another suggestion Barnett and Crippen (2014) make is to connect the activities to experiences similar to what they will encounter in the job setting, using the same procedures they will be required to use once employed. Curriculum career tasks are selected from several sources (e.g., O-NET, NOCTI).

The kits in this curriculum all contain real materials with activities that mirror things these students may actually do in a job setting.

For example, in the Childcare kit, participants learn to diaper and dress a baby using real diapers and clothes. In the Table Service kit, students learn to set and bus a table using real plates, cups, and silverware.

Evidence-Based Practices. Barnett and Crippen (2014) also include using evidence-based practices when teaching the job skills as a critical component in creating successful school-based employment opportunities.

This curriculum includes several evidence-based practices for individuals with autism and other developmental disabilities.

For example, teachers are instructed to use constant time delay to teach vocabulary and system of least prompts to teach students to complete each step in each activity.

Video models and visual schedules are also included as evidence-based strategies to promote independence of task completion. Both of these strategies are evidence-based for teaching a variety of acquisition and transition behaviors without relying on adult prompts (Spriggs, Knight, & Sherrow, 2015).

Although teachers are required to use evidence-based strategies when teaching, not all evidence-based strategies work for all students. To ensure all students are learning, the curriculum comes with progress monitoring built into each activity. Datasheets have been created to match the steps on the video models and visual schedules. This allows teachers to monitor the progress of each student when completing each activity in a given kit.

If a student is not making progress, the teacher can decide if changes need to be made to the existing evidence-based strategies or if supports need to be added back (e.g., if a teacher is only using the visual schedule and a student is failing to make progress, the teacher might decide to add the video model back into instruction).

Integrate Curriculum Activities into School Community. Integrating curriculum activities into the school community and using natural reinforcement (e.g., praise from people at school, job satisfaction) are two other suggestions for improving school-based employment outcomes (Barnett & Crippen, 2014).

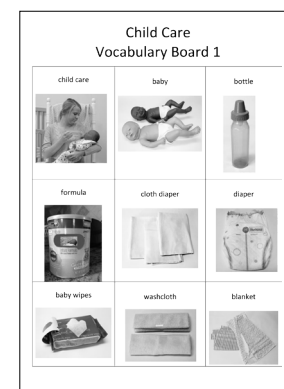
The sites in Kentucky gave a career exploration and interest inventory to their students before and after completion of both kits. The thought was to see if students' interests would change as a result of being exposed to the various career skills (i.e., would students find more job satisfaction in a career that they knew more about). The data were inconclusive mainly due to the fact that the students only completed two kits (the career exploration and interest inventory asked questions about eight different career paths).

Although the data were inconclusive, interviews with students indicated a preference to one kit over the other and it influenced career decision making for several students. Student preference for a particular kit varied by student, which is to be expected. Students reported liking Childcare over Table Service because they liked the baby; students reported liking Table Service over Childcare because they "wanted to work in a restaurant."

At the site in Clark County Public Schools in Kentucky, one participant said, "I liked the table service. It made me interested in being a waitress when I graduate." The teacher reported that she "would not have known this if not for these kits." The teacher reported that most of the students loved the table service and were even able to generalize the skills learned to setting the table, taking orders, filling orders, and busing tables for a group of administrators and teachers in the school. In the same setting, several students reported liking the activities in the Childcare kit. One student actually began rocking the baby independently after learning how to hold her correctly. The entire class was able to generalize the skills of the Childcare kit to the local pregnancy center in town.

Social Communication. Specific to individuals with autism and other developmental disorders, this curriculum has been designed to support their social communication and behavioral needs. Social communication needs are addressed thru the use of vocabulary boards that can be differentiated to meet the specific need for each student.

The curriculum comes with vocabulary boards that include real pictures taken from the resources in the kit or the video model filmed using the kit materials. The images are provided digitally. The teacher can use these images as needed (e.g., importing into a communication device, making larger pictures, providing vocabulary boards with less choices).



In addition, there are several activities within the kits that promote social communication. In the Table Service kit, for example, there is an activity where the students learn to take an order in a restaurant. There are suggested role reversal activities where students can practice taking or placing orders.

Teachers can adapt these activities as needed, providing picture supports or additional prompts to help students with social communication delays have success in completing these activities. Several of the supplemental activities in the kits also promote social communication skills. There are role plays, situation cards, and group games that can help students practice social communication skills within the curriculum they are learning to navigate.

Behavior. Along with social communication skills, many activities and supports included in the curriculum can be used to address behavioral issues. Since many behaviors occur because of delays in communication, the vocabulary boards may help reduce the communication related behaviors from occurring (Durand & Moskowitz, 2015).

Additional behavior supports include the visual schedules. They have been proven effective in increasing appropriate behaviors (e.g., time on-task, appropriate transition) as well as decreasing inappropriate behaviors (e.g., tantrums during transition) for students with autism (Knight, Sartini, & Spriggs, 2015) and other developmental disabilities (Spriggs, Mims, vanDijk, & Knight, 2016).

The predictability within the curriculum is another aspect that was designed with the behavioral challenges often associated with individuals with autism and other developmental disabilities in mind.

By definition, many people with autism are routine oriented and inappropriate behaviors can escalate when that routine is disrupted. Flannery and Horner (1994) found that problem behaviors could be reduced when events are predictable for individuals with severe disabilities.

The Project Discovery curriculum is designed in a way that every kit contains several activities. Although each activity is different in scope and sequence and materials, the order of implementation is the same every time: First Look, Student Instructions, video model, live model, student attempt with visual schedule.

This predictability should create an environment of known expectations and routines; these are both essential when creating an environment to support the social communication and behavioral needs of individuals with autism and other developmental disabilities.

Limitations and Directions for Future Work

As far as conclusions that can be drawn from this beta test, it is clear that all sites reported mean increases in knowledge (pre/post-test scores) and skill acquisition (activity training) for the kits their students completed.

The information was gained thru pre/post-test results and comparing independence in initial activity completion to the last activity completion (e.g., if a student completed a given activity for four sessions, their level of independence in the first session was compared to the fourth session). This provided useful information, but it was not within a rigorous research design.

Although data indicated gains in both areas, the gains could have been bigger if implemented in a different way.

For example, on the pre/post-test, several participants had pre-test scores above 5/10 (some were as high as 9/10). It might be more helpful to see true gains if there was a cutoff score used as inclusion criteria (e.g., participants included students with autism or other developmental disabilities with a reported IQ in the moderate intellectual disability or lower range and a pre-test score of 5 or below).

This could have changed the outcomes in several ways:

- 1) First, it would provide a more accurate picture of how students who needed to learn the material (as opposed to students who already knew 50% or more of the material) responded to the curriculum.
- 2) Second, the mastery criteria for moving on to the next activity was the majority (i.e., at least 50%) of the participating students in each site had to complete an activity 100% independently. If a class had several students that were performing well on the knowledge and skills within a kit prior to instruction, it potentially limited the amount of instruction some of the other students had with each activity. The average sessions to criterion across both kits was 2.5. The inclusion criteria would be one solution for this; another would be requiring a minimum number (e.g., 5) of sessions in each activity before moving on.

Teachers were not required to collect a baseline. Another issue with the way data were collected is that teachers were not required to collect a session of baseline before instruction began. It is hard to know exactly what gains were made since the students saw the First Look, Student Instructions, video model, teacher model, and had access to the visual schedule all before they were asked to complete a given activity. This likely elevated the first session scores over what baseline would have told us, making the gains look less than they really were.

Only tested two Adapted kits. We also only tested two Adapted kits: Childcare and Table Service. There are currently eight kits that have been updated, with plans for nine more. Exposing students to all titles would provide a better picture for student interests in possible future employment; asking students about possible future careers before they have experienced some skills in those careers is not likely to lead to meaningful outcomes for transition planning.

Conclusions

The beta testing for the *Project Discovery* Adapted Childcare and Adapted Table Service kits shows much promise.

The data clearly demonstrated an increase in knowledge and skills across multiple sites and states for each kit.

The teachers and students all reported enjoying the activities and found them to be beneficial for more than just career exploration.

For example, one site indicated that although students in that setting would likely not work in a daycare, the students learned skills to help parents at home. Another site reported that students were engaging in more communication, actually putting words together to form sentences for the first time. Several students reported having a new interest in a career after completing the kit; more than one indicated wanting to work in a restaurant.

Teachers of adolescents and young adults with autism and other developmental disabilities struggle with teaching job-related skills. Providing an established curriculum gives teachers the tools necessary to encourage those career ready skills. *Project Discovery* is a curriculum designed to include those tools to meet the needs of individuals with autism and other developmental disabilities.

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Participant Demographics

Table 1. Site 1, Clark County Public Schools, Kentucky

Participant	Age	Gender	Eligibility	Kit Participation
1	15	M	FMD	Childcare Table Service
2	15	M	MMD	Childcare Table Service
3	15	F	MMD	Childcare Table Service
4	16	M	FMD	Childcare Table Service
5	18	M	FMD	Childcare Table Service
6	20	F	FMD	Childcare Table Service
7	19	M	FMD	Childcare Table Service

FMD = functional mental disabilities (KY label for moderate/severe intellectual disability)

Table 2. Site 2, Fayette County Public Schools, Kentucky

Participant	Age	Gender	Eligibility	Kit Participation
1	15	M	FMD	Childcare Table Service
2	16	F	FMD	Childcare Table Service
3	18	F	FMD	Childcare Table Service
4	15	M	Autism	Table Service
5	16	M	Autism	Table Service

FMD = functional mental disabilities (KY label for moderate/severe intellectual disability)

Table 3. Site 3, Nelson County Public Schools, Kentucky

Participant	Age	Gender	Eligibility	Kit Participation
1	18	F	Multiple Disabilities	Childcare Table Service
2	14	M	FMD	Childcare Table Service
3	20	M	FMD	Childcare Table Service
4	15	F	FMD	Childcare Table Service
5	18	M	FMD	Childcare Table Service
6	15	M	FMD	Childcare Table Service
7	17	F	FMD	Childcare Table Service
8	16	F	FMD	Childcare Table Service
9	17	M	FMD	Childcare Table Service
10	20	M	FMD	Childcare Table Service
11	17	M	Autism	Childcare Table Service

FMD = functional mental disabilities (KY label for moderate/severe intellectual disability)

Table 4. Site 4, Woodford County Public Schools, Kentucky

Participant	Age	Gender	Eligibility	Kit Participation
1	15	M	FMD	Childcare Table Service
2	17	M	FMD	Childcare Table Service
3	20	M	FMD	Childcare Table Service
4	19	F	MMD Autism Ch.	Table Service
5	14	F	OHI Autism Ch.	Table Service
6	15	M	OHI	Childcare

FMD = functional mental disabilities (KY label for moderate/severe intellectual disability)

Table 5. Site 5, Mahtomedi Public Schools, Minnesota

Participant	Age	Gender	Eligibility	Kit Participation
1	16	NR	DCD-MM	Table Service
2	17	NR	DCD	Table Service
3	15	NR	SLI/OHI	Table Service
4	16	NR	DCD-MM	Table Service
5	15	NR	Autism	Table Service

DCD-MM = Developmental Cognitive Disability - Mild Moderate; DCD Developmental Cognitive Disability; SLI = speech and language impairment; OHI = other health impairment

Table 6. Site 6, Osseo Public Schools, Minnesota

Participant	Age	Gender	Eligibility	Kit Participation
1	15	F	Setting 3	Childcare Table Service
2	14	F	Setting 3	Childcare Table Service
3	14	M	Setting 3	Childcare Table Service
4	15	F	Setting 3	Childcare
5	15	F	Setting 3	Childcare Table Service
6	14	M	Setting 3	Childcare Table Service
7	15	M	Setting 3	Table Service

Setting 3 = most restrictive

Table 7. Site 7, Oshkosh Public Schools, Wisconsin

Participant	Age	Gender	Eligibility	Kit Participation
1	12	M	ID	Table Service
2	11	M	ID	Table Service
3	12	M	ID	Table Service
4	12	M	ID; visual impairment	Table Service
5	12	M	Autism; ID	Table Service
6	13	F	ID	Table Service
7	14	F	ID	Table Service
8	14	F	Autism; ID	Table Service
9	16	M	ID	Childcare
10	16	M	Autism; ID	Childcare
11	18	F	Autism; ID	Childcare
12	14	M	TBI	Childcare
13	17	F	ID	Childcare
14	18	M	Autism; ID	Childcare
15	21	M	Autism; ID	Childcare
16	15	M	Autism; ID	Childcare

ID = intellectual disability


Table 8. Site 8, Beaver Dam Public Schools, Wisconsin

Participant	Age	Gender	Eligibility	Kit Participation
1	16	M	Autism; ID	Table Service
2	19	M	Autism; ID	Table Service
3	18	F	ID	Table Service
4	17	F	ID; Orthopedic impairment	Table Service
5	16	M	Autism	Table Service


ID = intellectual disability

Example Questions from Pre-Test and Post-Test

Pre/Post Test
Child Care
Adapted Version



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1. Before you touch a baby, you should always...

A. Wash your hands



B. Fix a bottle



C. Get all needed items



D. Change the diaper



Yes!



2. When you dress a baby, what do you put on first?

A. Booties



B. Diaper



C. Blanket



D. Shirt



Great job!



3. Which would you feed a baby?

A. Hamburger



B. Formula



C. Soft foods









D. Small foods



Example Visual Schedule

Activity 7 Swaddling the Baby

To Do:		✓ When Done
1. Gather all materials.		
2. Wash your hands.		
3. Spread blanket on the table.		
4. Fold one corner down about 6”.		
5. Lay baby on blanket with head near folded corner.		
6. Lift the bottom corner of the blanket and bring it over the baby's body.		

Example Datasheet with Data and Scores

Activity 1
Lifting and Carrying a Baby
Data Sheet

Name: John Doe

Condition (Baseline or Intervention)	B	I	I	I	I	
Step: _____ Date: _____	1/3	1/4	1/5	1/6	1/7	
1. Gather all materials.	0	V	G	I	I	
2. Wash your hands.	0	I	I	I	I	
3. Name your baby.	0	V	A	I	I	
4. Talk to the baby, do not scare her.	0	V	A	I	I	
5. Put one hand under the head and neck. Put the other hand under her bottom.	0	PP	M	A	I	
6. Slide your hand that is under the head down the baby's back so your arms hold the baby up.	0	FP	M	A	I	
7. Use the other hand to support the legs. Lift the baby gently to your body.	0	FP	M	I	I	
8. Carry the baby close to you so she will feel safe.	0	A	A	I	I	
9. Put the baby down by holding the baby close to your body as you bend down, supporting the baby's back and neck.	0	FP	M	A	I	
10. Clean up the area and put the baby away.	0	M	G	G	I	
11. Wash your hands.	0	I	I	I	I	
Number Independent	0	2	2	7	11	
Number Points Earned	0	28	42	59	66	
How did I do?	☺	☺	☺	☺	☺	☺
	☹	☹	☹	☹	☹	☹
	☹	☹	☹	☹	☹	☹
Do you like lifting and carrying a baby?	☺	☺	☺	☺	☺	☺
	☹	☹	☹	☹	☹	☹
	☹	☹	☹	☹	☹	☹

Key: I=Independent; G=gesture; A=auditory/verbal; V=visual/picture; M=model; PP=partial physical; FP=full physical; 0=no response (this would be used during baseline only)

Points earned: I=6; G=5; A=4; V=3; M=2; PP=1; FP=0

Anecdotal Notes: _____