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A Case Study in Using Explicit Instruction to Teach Young Children Counting Skills

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Abstract

Number sense is one's ability to understand what numbers mean, perform mental mathematics, and look at the world and make comparisons. Researchers show instruction that teaches children how to classify numbers, put numbers in sequence, conserve numbers effectively, and count builds their number sense skills. Targeted instruction that teaches children to count in a flexible manner increases number knowledge, therefore improves number sense. A common manner of providing targeted instruction for children who have mathematics difficulties is called explicit instruction. Explicit instruction that utilizes objects and pictures teaches conceptual and procedural knowledge for specific mathematical skills. Researchers show explicit instruction improves mathematical skills which range from place value to algebra equations for students who have mathematic difficulties. The purpose of this case study was to explore and investigate if further research should be conducted on the use of explicit instruction to teach young children counting skills that lead to flexibility with numbers. Results and implications are discussed.

Number sense is a developing construct that refers to children's fluidity and flexibility with numbers, the sense of what numbers mean, and the ability to perform mental mathematics, and the adeptness to observe the world to make comparisons (Berch, 1998). Difficulties with numeracy (i.e., number sense) interfere with acquisition of math skills (i.e., number operations and fractions) later in childhood (Clarke & Shinn, 2004; Mazzocco & Thompson, 2000; Van Luit & Schoman, 2000). According to Berch (2005), researchers have not come to a consensus of what number sense is; however, Jordan, Kaplan, Olah, and Locuniak (2006) identified key elements of numeracy. They are mathematical skills such as counting, number knowledge, number transformation, estimation, and the ability to create and identify number patterns.

Counting Principles

Counting is the most basic skill required for number sense. Gelman and Gallistel (1978) describe fundamental principles children must possess to be successful in counting. The first principle is one-to-one correspondence which asserts that one and only one number is assigned to each object in a set. The second principle is the stable order principle which asserts that number words always progress in the same order. The third principle is the cardinal principle which asserts that the last number word counted represents the sum of the set. The fourth principle is the irrelevance principle which asserts that object order for counting does not influence the final number counted for the set. The last principle is the abstraction principle which asserts that the principles of one-to-one correspondence, stable order, cardinality, and irrelevance apply when counting any set, regardless of what the collection of objects look like. The aforementioned principles also encompass the notion of conservation of numbers. Conservation of numbers means that children conserve numbers when they realize that sets of numbers remain equivalent regardless of their arrangement (Piaget & Szeminska, 1952).

Application of Counting Principles

Counting skills improves number sense because it increases children's understanding of seriation, classification, and conservation of numbers (Clements, 1984; Fuson, Secada & Hall, 1983; Van de Rijt & Van Luit, 1998). Because counting improves children's number sense, it is important to know the trajectory of learning how to count and how the principles of counting apply to counting skills. Van de Rijt and Van Luit (1998) explain the learning trajectories of young children as they gain counting skills. At the age of three, children first learn acoustic counting usually through little songs or rhymes. This involves young students saying numbers but not connecting numbers with objects. After acoustic counting, children begin to count asynchronously. This is when young learners realize that numbers can be used to count objects, but they are not able to point to one object while enumerating one number. When children count asynchronously, they do not have one-to-one correspondence. The lack of one-to-one correspondence is demonstrated when students miss an object or point to the same object twice while counting. At the age of four or five, children are capable of counting and pointing to objects at the same time which demonstrates they have learned the one-to-one correspondence principle. When children count using one-to-one correspondence, it is called counting synchronously. After synchronous counting, children demonstrate resultative counting which means they have mastered the principle of stable order and cardinality. This is because in resultative counting, young students are aware that counting has to begin with the number one, that every object has to be counted once, and that the last number gives the total number of objects. After resultative counting, children progress to another counting skill called shortened counting (also referred to as counting on). To perform shortened counting successfully, children must be able to apply the principle of irrelevance. To apply the principle of irrelevance, children must recognize the representation of a number. Shortened counting is demonstrated when young students count on from a representation of a number they see. For example in a pair of dice, the student would see five dots on one piece and three dots on the other piece. Instead of touching each dot, the student would say five and continue to count dots on the other die piece. After children master the skill of shortened counting, they are able to count in a flexible way which is a foundation of number sense (Berch, 1998; National Council of Teachers of Mathematics, [NCTM], 2000).

Explicit Instruction

Programs such as the *Piacceleration Curriculum,* the *Additional Early Mathematics* (AEM) program and the *Young Children with Special Education Needs Count Too* (Pasnak, Hansbarger, Dodson, Hart, & Blaha, 1996; Pasnak, Holt, Campbell, & McCutcheon, 1991; Van Luit & Schopman, 1998, 2000; Van de Rijt & Van Luit ,1998) were used to teach students numeracy. These curriculum combined discovery and structured instructional methods that taught students how to classify numbers, put numbers in sequence, and conserve numbers. Even though these programs were promising, they did not provide targeted supplemental instruction specifically for counting. One method of instruction that can be used to teach counting as a targeted instructional intervention is explicit instruction with objects and pictures because it builds conceptual and procedural of the mathematical skill (Miller, 2009). Conceptual knowledge is an understanding of what is occurring with the numbers while procedural knowledge is an understanding of how to perform the steps required in completing a mathematical task (Miller, 2009). Explicit instruction has been shown to be effective in teaching mathematics for students with disabilities and has been adapted to provide supplemental targeted instruction for many different mathematic skills (Flores, 2009; Flores, Hinton, Strozier, & Terry, in press; Kaffar & Miller, 2011; Peterson, Mercer, and O'Shea, 1988; Mercer & Miller, 1992; Miller, 2009). Examples of mathematic skills which have been taught through explicit instruction include place value, addition and subtraction of numbers, multiplication, regrouping, fractions, integers, and algebra equations (Bulter, Miller, Crehan, Babbitt, & Pierce, 2003; Flores, 2010; Peterson et al., 1988; Kaffar & Miller, 2011; Maccini & Hughes, 2000; Mercer & Miller, 1992; Morin & Miller, 1998; Strozier, 2012; Witzel, Mercer, & Miller, 2003). To date there needs to be more information on what a specific counting instruction for students with disabilities would look like and whether further inquiry in explicit instruction for counting skills is warranted.

Method

This study was an exploration of the implementation of explicit instruction to teach resultative counting and shortened counting to students with disabilities. Therefore, a case study was chosen to investigate what would happen if explicit instruction was implemented to teach counting skills. Students' baseline and intervention performance were graphed based on results of formative assessments. This method is currently implemented in schools to monitor student progress, making it an appropriate choice for this case study. Results include a description of students' responses as well as the progress students made in counting.

Participants

This case study included three students in preschool, one student in kindergarten, and one student in first grade who demonstrated a need to learn counting skills. All participants attended a summer program for students who have developmental disabilities, and received explicit instruction in counting. The participants were four students who received instruction for resultative counting, and one student who received instruction for resultative and shortened counting. All participants had mathematics listed as a need in their individualized educational programs (IEP) and educational goals tied to counting skills. Four participants were between the ages of four and six, were identified as having a developmental delay, and received special education services in a pre-kindergarten or kindergarten classroom. One student was seven, was identified as having a developmental delay, and received special education services in first grade. See Table 1 for an overview of participant characteristics.

Setting

Mathematics instruction took place within one classroom of a university-sponsored extended school year program. The program was one month in length and students attended the program five days a week for three hours. All students received instruction according to the students' IEP goals for reading, writing, and mathematics. The counting instruction was supplemental and

Table 1. *Participant characteristics*

Name	Age	IQ Composite	IQ Instrument	KTEA Brief II Math Achievement Standard Score
Casey	4	105	Leiter-R	88
John	5	48	K-BIT II	83
Nash	5	94	K-BIT II	92
Kent	7	64	K-BIT II	59
Tara	6	Unavailable	Unavailable	54

was provided for two weeks of the month-long extended school year program. Explicit instruction for resultative and shortened counting skills was provided daily for about 15 to 20 minutes by a researcher along with independent work stations that reinforced skills matching quantities and identifying numbers. Counting instruction was implemented in small groups ranging from one to five students. The groups were organized based on the skill students were learning. The researcher, who provided mathematics instruction in counting, did not provide instruction for reading or writing. The classroom teacher provided reading and writing instruction.

Materials

Lesson materials included sheets used as work mats, lesson sheets that had drawings of circles students could count, and cubes. Work mats consisted of construction paper or a blank sheet of paper on which the researcher and students would place cubes to count. The work mats were used as a visual cue that helped students organize the cubes they were counting and see the numeric amounts of cubes they were manipulating. Lesson sheets included numeric pictorial representations of circles which ranged from numerical representations of one to ten. The first three lessons for each counting skill involved cubes and work mats. There were seven lesson sheets for resultative counting, and seven lesson sheets for shortened counting. Flash cards were used in the advanced organizer of the lessons for shorten counting in which each card had a specific number of circles that represented a certain number. As students progressed through the lessons, the amount of circles on the flashcards increased (i.e., from five circles to eight, etc.), but did not exceed the amount of ten. Instructional procedures that utilized the work mats, lesson sheets, cubes, and flashcards were discussed in the instructional procedures section.

Progress monitoring assessments (i.e., probes) were given before instruction began. The probes consisted of sheets of paper that prompted students to count six sets of cubes or six sets of numerical representations for each category of counting (i.e., resultative counting and shortened counting). Every probe looked similar to the lesson sheet used the previous day for each counting skill but had different numerical amounts. For example, if students were to place and count cubes on a work mat, the probes consisted of a work mat in which students were asked to place cubes and count. If students completed lessons using lesson sheets, the probes looked similar to the lesson sheets. Probes that assessed shortened counting included cubes or pictures of circles arranged in a pattern similar to dice along with additional cubes or pictures of circles students were expected to count. Examples of counting probes and learning sheets are provided in Figure 1 and Figure 2.

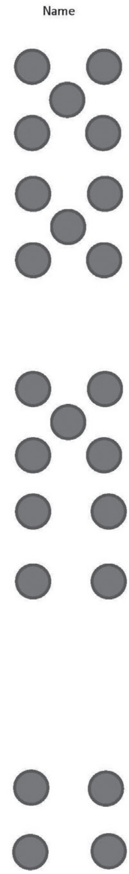

Figure 1. Resultative counting probe.

Standardized norm referenced assessments were used to obtain information regarding students cognitive functioning and their mathematics achievement. Students five years of age and older were administered the Kaufman Brief Intelligence Test II (K-BIT II) and one student who was four years of age was given the Leiter-R. One student was absent during the administration of the K-BIT II, therefore a measure of cognitive functioning was not obtained for that student. Measures of mathematics achievement were obtained using the Kaufman Test Educational Achievement II Brief (KTEA II) assessment. The K-BIT II was correlated with the Wechsler Abbreviated Scale of Intelligence-III (WASI-III) and the Wechsler Abbreviated Scale of Intelligence-IV (WASI-V) at 0.76 and 0.77 respectively. The reliability of the K-BIT II was 0.93. The Leiter R was correlated with the Wechsler Intelligence Scale for Children III (WISC III) full scale intellectual quotient score with a correlation of 0.85. Reliability for the Leiter R was 0.88. The Brief KTEA II was correlated with the Wide Range Achievement Test (WRAT) and Woodcock Johnson III (WJIII). The correlations of the Brief KTEA II mathematics achievement subtest with the WRAT and WJIII mathematics achievement subtests were 0.75 and 0.74 respectively. The adjusted test-retest reliability of the Brief KTEA II was 0.90.

Instructional Procedures

Before the instructional lessons began, a researcher or the classroom special education teacher implemented the probes to gather authentic information on student progress. Therefore, on the following day, before instruction was implemented, the assessments were administered to investigate if students

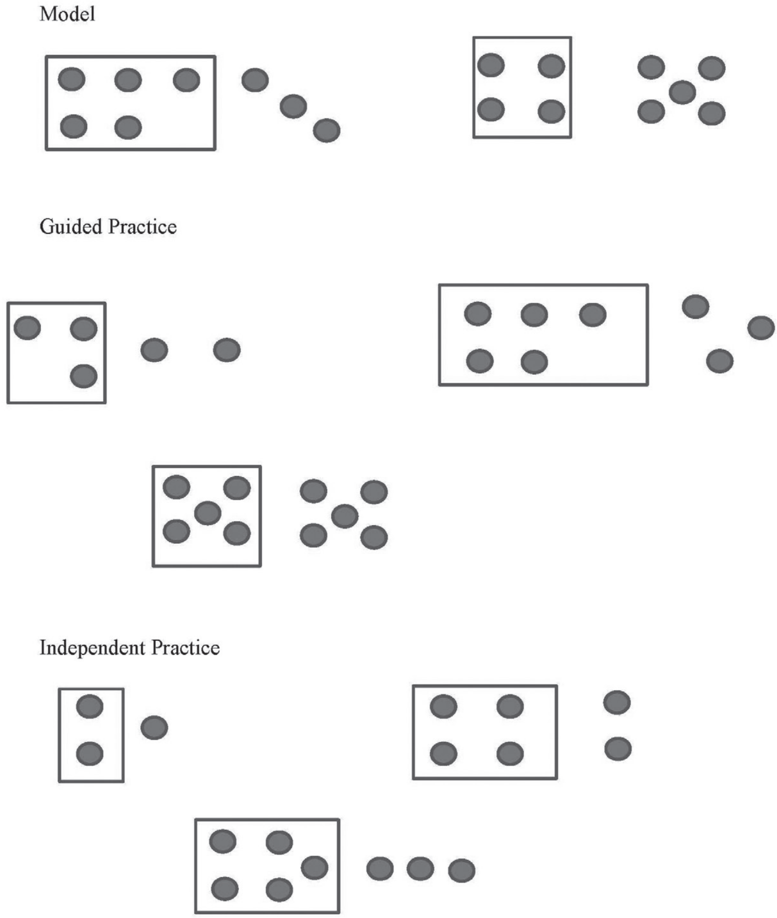

Figure 2. Shortened counting lesson sheet

retained the counting skill previously taught. Each assessment administered in the instruction condition was implemented approximately twenty-four hours after the instruction occurred. Instructional sessions lasted for 15 to 20 minutes, and were provided in small groups of one to three students at a time. Small groups were arranged by ability level and when students were not receiving small group instruction, they were participating in independent work stations that targeted mathematics skills such as matching quantities and identifying numbers.

Each small group session used explicit instructional techniques. There were (a) provide an advance organizer, (b) demonstrate and model the skill, (c) provide guided practice, (d) provide independent practice, and (e) provide a post organizer (Miller, 2009). In the advance organizer students were told what they were going to be doing, and why the counting technique is important to learn. During modeling, the researcher showed students how to use the counting skill. The researcher demonstrated the counting technique with cubes and circles on the learning sheet. After modeling, guided practice was implemented. During guided practice, the researcher and students used the counting skill together. The researcher provided cues, and at times hand-over-hand assistance, for those who needed it as a way of assisting students in using the counting technique. Independent practice followed guided practice which allowed students to demonstrate the counting skill without assistance. To limit any possible frustration with the learning process, the researcher provided assistance to students after their first attempt during independent practice but did not offer answers. After independent practice, the researcher gave students feedback and reviewed the counting skill.

Lessons were divided into categories depending on the counting technique. The categories were resultative counting and shorten counting. Each category consisted of ten lessons (e.g., three using objects and seven using pictures of circles on lessons sheets) for a total of 20 lessons. Lessons built on each other and became more complex, and a criterion of counting at least four of six sets correct was established before students would move on to the next lesson. For example, students were first provided instruction in resultative counting, and had to reach a criterion of counting four out of six sets correctly for two consecutive days. Once students met the criterion for resultative counting they received instruction in shortened counting. Each counting technique started with lessons that used cubes and work mats. Using the steps of explicit instruction, students and the researcher used the cubes to implement the counting skill on the work mat. The first three lessons were implemented using cubes and the following seven lessons involved learning sheets that had pictures of circles the researcher and students would count.

Instruction with Cubes and Work Mats

When teaching students how to count resultatively, the researcher reviewed orally counting to ten, told the students they were going to learn how to place and count, and explained that placing and counting is a way of knowing how many cubes there are. The researcher placed an amount of cubes (the amount started with a small number such as three and all lessons never exceeded the amount of ten) in front of the students and said “I want to know how many cubes there are. Watch me, I will place and count to find out. When I count I start with one.” Then the researcher placed cubes on the work mat, one by one, and said the respective number as the cube was placed on the mat. The researcher said there are ____ number of cubes.

After providing several examples, the researcher would clear the mat, put another amount of cubes on the table and say “Let’s find out how many cubes there are now. Let’s place and count together.” The researcher placed the cubes one by one and would have students say the number simultaneously with the researcher that corresponds with the cube. The researcher would clear the mat again and give students turns in which the researcher would have students place an amount of cubes, one by one, and count along with the students. The researcher repeated this procedure at least three times during instruction, and would give opportunities for students to place and count objects with the researcher. Then the researcher gave each student cubes of varying amounts from one to ten and instructions for the students to place and count cubes on their work mat without assistance. For students who demonstrated difficulty starting with one or saying the last number when counting, the researcher would provide assistance, and prompt the student to say a number. After independent practice, the researcher provided feedback based on students' responses. For example, if a student did not place and count during independent practice, the researcher would prompt the student by saying, "Give me ____." The student would count and place the amount of objects in the researcher's palm.

For shortened counting, the researcher reviewed resultative counting, and said they were going to learn how to count on. The researcher explained counting on makes counting how many of something faster and easier. The researcher would say, "To count on we must say an amount we see and continue counting the rest. To practice saying an amount I am going to show you flashcards with circles. I will say the amount of circles on each flashcard and then we will practice together." The researcher would show students flashcards that contained sets of circles between one and five, say the amount and have students repeat by answering how many.

After practice with the flashcards, the researcher then modeled how to count on using the work mat. The researcher would put an amount of cubes on the mat, and have cubes on the table as well. The researcher would say the amount of cubes on the mat, and then continue counting by placing and counting the cubes that were on the table onto the mat. After modeling several times, the researcher would clear the work mat, place more cubes on the mat and table, and then prompt students by saying, "Let's count on together." The researcher and students would say an amount and continue counting the cubes on the table by placing and counting them on the mat. Once students received practice with the researcher in counting on, students were given instructions to count on independently. For students who demonstrated difficulty with counting on, the researcher would provide assistance, and prompt the student to say a number and continue counting. After independent practice, the researcher provided feedback and review based on student responses. Correct responses included students saying the amount of cubes on the mat, continuation of placing and counting cubes that were off the mat, and saying the correct total amount of cubes.

Instruction with Pictures on Lesson Sheets

Starting at the fourth lesson for each category of counting skill, lessons included learning sheets that had numeric representations made by pictures of circles. The numeric representations started with small sets of circles and built in complexity to the number ten. Instruction with lesson sheets was the same as with the work mats and cubes, except for one difference. Students and the researcher used the lesson sheets that had drawings of circles to demonstrate and practice the counting skill instead of cubes and work mats.

Results

Instructional progress was monitored and graphed for each student. Figure 3 summarizes Casey's performance, Figure 4 summarizes John's performance, Figure 5 summarizes Tara's performance, Figure 6 summarizes Kent's performance and Figure 7 summarizes Nash's performance.

Casey. Casey received special education services in preschool under the category of developmental delay. Casey could rote count to ten but could not count objects using one to one correspondence, identify numbers one to ten, or match quantities zero to ten to numbers. Before instruction, Casey demonstrated asynchronous counting in which he touched the circles, yet the number he assigned to the circles did not coincide with the amount. For example, he would touch the same circles more than once, or skip circles while counting to ten. For one set, Casey touched and counted synchronously but stated a different number for the amount he counted. The following day,

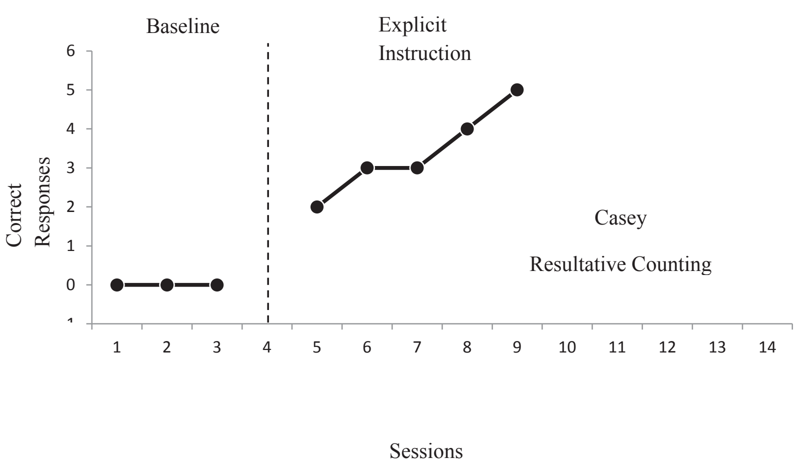

Figure 3. Casey's progress.

after the first day of explicit instruction, Casey counted two sets that contained quantities of two and three resultatively. This means he counted synchronously and demonstrated cardinality for those amounts. After another day of explicit instruction Casey counted sets that contained quantities of six or less resultatively. He synchronously counted a set of seven; however, he stated six as the amount for the set. By the end of the second week, Casey consistently counted sets with quantities of five or less resultatively and counted sets of up to ten with resultative counting, yet not consistently.

Upon examination of formative assessment, Casey's baseline data were stable with zero quantities resultatively counted correctly. There was an immediate change in level of performance between baseline and instruction and no overlapping data points between the baseline and instructional phases. The instructional phase data points show an upward path which indicated steady improvement.

John. John received special education services in preschool under the category of developmental delay. John could rote count to ten but could not count objects using one to one correspondence, identify numbers one to ten, or match quantities of zero to ten to their corresponding numbers. Before explicit instruction, John demonstrated acoustic counting. He touched the circles on the assessments without counting, and after touching all circles would say a number. The following day after explicit instruction, John counted asynchronously. That is, he touched the circles and said numbers; however, the numbers he stated did not correspond with the circles he touched. By the end of the first week, he counted sets of four or less using resultative counting. This means he counted synchronously and demonstrated cardinality for those amounts. He also demonstrated synchronous counting for sets more

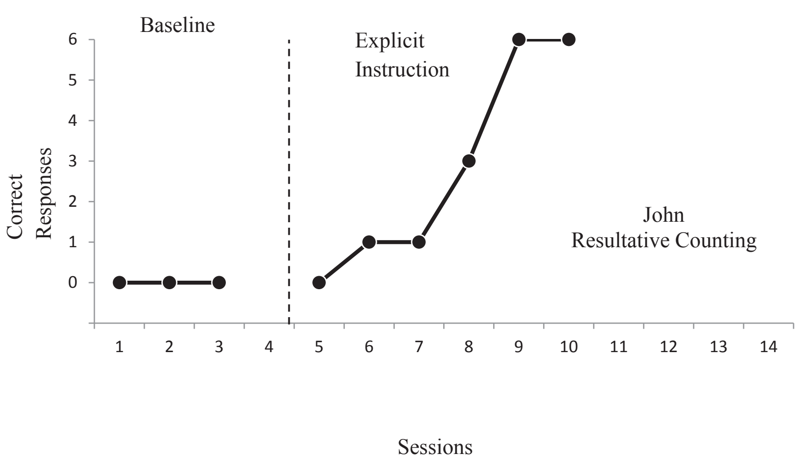

Figure 4. John's progress.

than four, yet he stated the wrong number indicating the amount. By the end of the second week, John counted all sets up to ten resultatively.

Upon examination of formative assessment, John's baseline data were stable with zero quantities resultatively counted correctly. There was a change in level of performance between baseline and instruction and one overlapping data point among the baseline and instructional phases. The instructional phase data points show an upward path which indicated steady improvement.

Tara. Tara received special education services in kindergarten under the category of developmental delay. Tara could rote count to ten and could identify numbers one to ten. She could not count objects using one to one correspondence, or match quantities of one to ten to their respective numbers. Before explicit instruction, Tara counted most sets using synchronous counting, however she counted quantities of seven or more asynchronously. She would also say a number after counting all sets presented on the page. For example, there were three sets of circles with the amounts of two, ten, and three respectively presented on the page. Tara counted the set of two, counted the set of ten (starting with the number one), and then counted the set of three starting with a number such as four. She then said a number such as seventeen to answer how many in the sets. The following day after explicit instruction, Tara counted a set of three, a set of two, and two sets of eight resultatively, demonstrating cardinality for those sets. She counted a set of six using synchronous counting but stated five as the quantity of the set. She also counted a set of five using synchronous counting but stated four as the

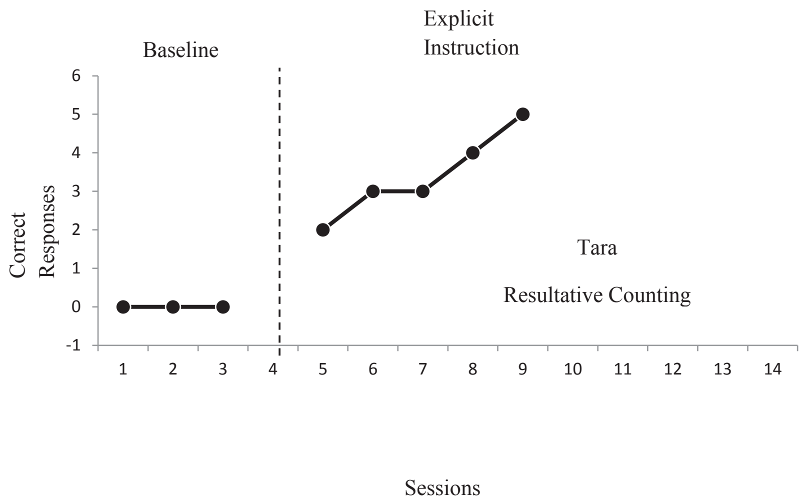

Figure 5. Tara's progress.

amount. By the end of the second week, Tara counted sets of five or less and sets of ten and eight consistently using resultative counting. She counted sets of six and seven synchronously; however, stated the wrong number for the quantity of the set.

Upon examination of formative assessment, Tara's baseline data were stable with zero quantities resultatively counted correctly on two probes, and one quantity resultatively counted correctly on one probe. There was an immediate change in level of performance between baseline and instruction and no overlapping data points among the baseline and instructional phases. The instructional phase data points show an upward path which indicated steady improvement.

Kent. Kent received special education services in first grade under the category of developmental delay. Kent could rote count to fifteen, could identify numbers one to ten, and could count up to four objects using one-to-one correspondence. He could not count more than four objects using one-to-one

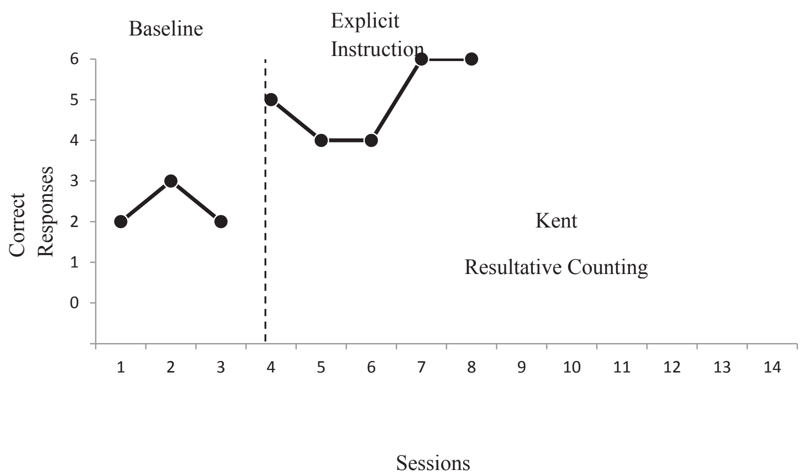

Figure 6. Kent's progress.

correspondence, or match quantities to their corresponding numbers. Before explicit instruction, Kent resultatively counted sets of four or less. The following day after explicit instruction, he counted all sets resultatively except for a set of nine. At the end of the first week, Kent showed difficulty counting sets of seven or more in which he synchronously counted the circles, but said the wrong amount. By the end of the second week he counted all sets up to ten resultatively demonstrating cardinality for all sets.

Upon examination of formative assessment, Kent's baseline data were stable with two quantities resultatively counted correctly on two probes, and three quantities counted correctly on one probe. There was an immediate change in level of performance between baseline and instruction and no overlapping data points among the baseline and instructional phases. The instructional phase data points show an upward path which indicated steady improvement.

Nash. Nash received special education services under the category of developmental delay. Nash could rote count to fifteen, count objects using up to six using one-to-one correspondence, identify numbers one to ten, and could match quantities up to five with their corresponding numbers. He could not match quantities of six or more with numbers or use shortened counting. Explicit instruction in counting was implemented, and after the second day of instruction, Nash counted all sets up to ten using resultative counting

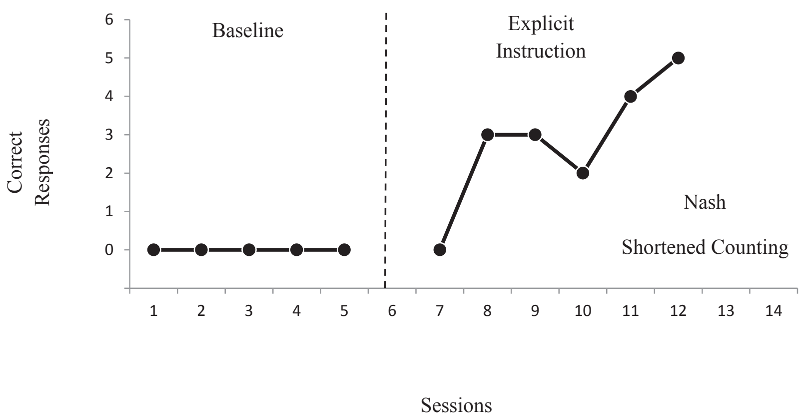

Figure 7. Nash's progress.

and demonstrating cardinality for all sets. The following day, after explicit instruction in shortened counting, Nash successfully demonstrated shortened counting for sets of ten or less which also had the initial number of three or less. For example, he said three for the initial number amount, continued to count stating four as the next number, counted the rest of the circles in the set, and finally stated the quantity of the entire set accurately. By the end of the second week, Nash accurately demonstrated shortened counting for sets of ten or less, which had the initial number of five or less consistently. This means he was able to approach counting numbers in a more flexible way instead of relying on resultative counting.

Upon examination of formative assessment, Nash's baseline data for resultative counting were trending upward indicating partial mastery, therefore baseline and instruction data for shortened counting were collected instead. Nash's baseline data for shortened counting were stable with zero quantities counted correctly. There was a change in level of performance between baseline and instruction with one overlapping data point among the baseline and instructional phases. The instructional phase data points show an upward path which indicated steady improvement for shortened counting.

Conclusion

The purpose of this study was to explore the use of explicit instruction in teaching young children counting skills. Four students received instruction for resultative counting and one student received instruction for shortened counting. All students showed improvement in counting skills. Casey improved from zero sets of quantities resultatively counted correct to counting five sets correctly. John improved from zero sets of quantities resultatively counted correct to counting six sets correctly. Tara improved from zero sets of quantities resultatively counted correct to counting five sets correctly. Kent improved from three sets of quantities resultatively counted correct to counting six sets correctly. Nash improved from correctly counting zero sets of quantities using shortened counting to counting six sets correctly.

Counting is the most basic skill required to build number sense (Jordan et al., 2006). This study demonstrates that explicit instruction to teach counting should be investigated further. Explicit instruction that utilizes objects and pictures has been found by researchers to improve skills that range from place value of numbers to algebra equations (Bulter et al., 2003, Flores, 2010; Peterson et al., 1988; Kaffar & Miller, 2011; Maccini & Hughes, 2000; Mercer & Miller, 1992; Morin & Miller, 1998; Strozier, 2012; Witzel, Mercer, & Miller, 2003). Researchers also showed explicit instruction is very versatile and, therefore, has potential in counting instruction.

Implications

It is very important that teachers have a variety of evidence- based instructional practices that improve many different skills and children's mathematical knowledge. Because numeracy is so important to children's mathematical achievement, it is vital that researchers discover effective instruction that can increase students' numeracy (NCTM, 2000). Programs have been developed to build numeracy skills for young learners, however supplemental targeted instruction for counting is not widely available. Explicit instruction is a way to build conceptual and procedural knowledge of mathematical skills, and has already been shown as an effective tool for mathematics teaching (Miller, 2009). One reason explicit instruction could be effective to teach counting is because it builds on conceptual and procedural knowledge in direct ways. For example, the instructor tells students that you count to answer the question of how many, then he or she implements instruction that requires students to count objects and pictures which answer how many are in the set. In addition, the instructor directly teaches students how to carry out the task of counting. For example, students were taught how to place and count using objects, touch and count using pictures, and even say a number of an amount and continue counting by touching pictures to get a total number for the set. To increase the likelihood of mastery of the concept and procedures of counting, the steps of explicit instruction require children have ample amounts of practice with the instructor before having to count independently. Lastly, explicit instruction also requires feedback on student performance that ensures students gain understanding of the concept as well as the procedures for the specific counting skill.

Limitations and Future Recommendations

This case study helped to show that further research was warranted to investigate the use of explicit instruction as a way to teach counting skills for students with disabilities. There were several limitations that need to be mentioned. First, a researcher was the instructor in this case study. To limit bias and gain more accurate representations of student learning, assessments were given before instruction and were also administered by someone other than the researcher as much as possible. However, that still does not negate the fact that the researcher was the one who provided mathematics instruction for this case study. Future research should include an instructor other than a researcher. Because this study was a case study, results do not demonstrate experimental control in which explicit instruction for counting was shown to effect students' acquisition of counting skills. Future research should include experimental control that can show cause and effect, and include measures to ensure validity and reliability of instructional procedures and assessments. Additionally, the setting for instruction involved only one classroom in one extended school year program in which background knowledge of participants was not included. Therefore, results, even if experimental control was demonstrated, cannot be generalized for other young learners with developmental delays. In the future, research should be conducted in group designs in which more demographic information is available and results can be generalized. Research should also involve comparisons to other programs that teach counting skills for young students with disabilities. It is very important that teachers and have as much evidence- based instructional practices as possible to teach young learners mathematics. Explicit instruction may be one tool educators can use to empower young children with disabilities how to count and improve their understanding of numbers.

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