The Effects of Direct Instruction Flashcard System and Model, Lead, and Test on Numeral Identification for a Nonverbal Preschool Girl with Developmental Delays

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ABSTRACT

The purpose of the present study was to evaluate the effects of the Direct Instruction (DI) flashcard system combined with model, lead, and test on the mastery of numerical identification for a nonverbal preschool girl with developmental delay. The research was carried out in a self-contained preschool classroom. The classroom enrolled children with delays in the skill areas of pre-academic, expressive communication, receptive communication, gross motor, fine motor, or adaptive. Our participant was a 4-year-old girl scheduled to be placed into an integrated preschool containing a combination of children with delays in one or more area and their typically developing peers the following year. She was behind her typically developing peers in the area of numeral identification. A single-subject, multiple baseline design across three sets of target numerals was used to evaluate the effectiveness of the DI flashcard procedure. A functional relationship was shown between numeral recognition and the implementation of our intervention. Suggestions for future research were made.

Keywords: DI flashcards, model, lead, and test, numeral identification, developmental delays.

I. INTRODUCTION

The skill of numeral identification is the first prerequisite skill that a child needs to be able to successfully maneuver his or her way in today's math driven world. In a general sense, the acquisition of numeral identification skills is paired with the ability to identify and analyze patterns, as well as gain logic and critical thinking skills ("Why math is," 2010). Specifically, understanding the concepts of time, money, and measurement, as well as being able to accurately read and count days on a calendar are some of the basic, yet necessary, skills that depend on numeral identification. Correlations have also been found between numeral identification and other fundamental skills such as reading. According to one study, "within beginning readers, letter and digit naming, speed, and knowledge of letters and numbers and their names are confounded, particularly among those most likely to develop reading problems (Bowey, McGuigan, & Ruschena, 2005). Thus, the skill of numeral identification, along with the ability to identify numerals fluently (accurately and quickly) affects other areas of development and the acquisition of other crucial skills.

Aside from the early logic and thinking skills consequences of numeral identification skills, later crucial consequences are also

associated with numeral identification. An individual's success in financial and educational endeavors is dependent on the acquisition of basic math skills, and thus is also dependent on the prerequisites of those skills, such as numeral identification. The society in which we live is an increasingly credential-dependent society. College degrees are a major factor in financial and career success. Numeral identification skills are a foundational skill for furthering education to achieve a degree or other credentials such as certifications. The inability to identify numerals affects still more facets of life, such as the ability to complete the simplest of daily tasks and handle one's affairs. Tasks such as shopping, turning on a microwave, cooking, taking medication, and paying the bills would not be feasible for an individual who has not successfully mastered this skill. Lack of numeral identification skills can also lead to an "overdependence on experts and professionals and uncritical acceptance of charlatans and the claims of pseudoscience" (Kerka, 1995).

Early intensive behavioral interventions have been shown to be capable of improving the social as well as academic skills for students with various disabilities (Goin-Kochel, Myers, Hendricks, Carr, & Wiley, 2007). The (DI) flashcard system is particularly useful in teaching children with developmental delays. DI flashcards have been effective in teaching a wide range of skills. This has included shapes (Herberg, McLaughlin, Derby, & Gilbert, 2011) number identification (Ehlers, McLaughlin, Derby, & Rinaldi, 2012), sight words (Crowley, McLaughlin, & Kahn, 2013; Higgins, McLaughlin, Derby, & Long, 2012), as well as letter sounds (Bulkley, McLaughlin, DI flashcards have been implemented with a wide range of students and in a large variety of classroom configurations. The student populations have included children with learning disabilities (Erbey, McLaughlin, Derby, & Everson, 2011; Mann, McLaughlin, Derby, Everson, & Williams, 2012), preschool students with developmental delays (Fitting, McLaughlin, Derby, & Belcher, 2012; Houglum, McLaughlin, Weber, Williams, & Gould, 2013, Mangundayo, McLaughlin, Williams, & Toone, 2013), high school students with intellectual disabilities (Hayter, McLaughlin, Derby, & Scott, 2008), high school students with severe behavioral issues (Brasch, Williams, & McLaughlin, 2008), typical developing elementary school students (Skarr et al., in press). Various classroom settings have included a typical general education elementary school classroom (Skarr et al., in press), a self-contained classroom in a special day school (Brasch et al., 2008), an after school tutoring program at a local university (Standish, McLaughlin, & Neyman, 2011), and in the home with the procedures implemented and evaluated by a parent (Mann et al., 2012).

The purpose of the present research was to teach a single preschooler with developmental delays numeral identification. Second, we wanted to replicate our earlier research employing flashcards with model, lead, and test with reward for preschool student with language deficits. The final purpose was to teach the skills needed for our participant to be successful in school the following year.

II. Materials and Method

Participant and Setting

The participant was chosen by a collaborative effort between the first author and cooperating teacher. The participant was a 4-year-old (50-month-old) female who was enrolled in a self-contained special education preschool in the Pacific Northwest. The classroom was located in the poorest elementary school in the school district. At 8 months, she was diagnosed as failure to thrive and began receiving special services through Infant Toddler Network. The participant had been attending the special education preschool since her third birthday (about 14 months prior to the intervention), and it was her first

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placement in any education setting. The participant qualified for special education under the category of developmentally delayed and through all six preschool qualifying areas according to the evaluation done by the school psychologist. These areas were cognitive/pre-academic, behavior/social, adaptive, fine motor, gross motor, and communication. Of these areas, the most immediately evident area of need was the participant's communication qualification, specifically her expressive communication. The participant was primarily nonverbal (aside from the words "yes" and "no"), and was believed to be Dyspraxic by both the cooperating teacher and the classroom speech pathologist, though this was not formally diagnosed. Due to her lack of verbal expressive communication skills, she also received outside speech therapy. Though the participant's verbal skills were constantly being developed throughout the preschool session, the participant had also been provided with the augmentative communication device of a Flip-and-Talk Picture Communication Board (Mayer-Johnson, 2013). This communication board displayed picture icons representative of many commonly used words and phrases such as "I", "you", "want", "have", "yes", "no", "all done", "please", and "thank you", as well as sections of word categories including snack options, colors, shapes, numerals, classroom activities, days of the week, and months of the year. Because the communication board had been newly implemented, and the participant had such extreme expressive communication delays, it was unknown, prior to the study, what pre-academic skills the participant had but had not been able to display without the communication board. Several trials were done, therefore, testing her color identification, shape identification, and numeral identification. Though the use of these informal assessments, it was determined by the first author and the cooperating teacher to focus intervention on increasing numeral recognition skills. Though the student had no IEP goal focusing on this skill, we felt was an important skill for her to acquire to be successful in preschool and in kindergarten in the future. To teach the skill of numeral recognition a Direct Instruction (DI) Flashcard system, and model, lead, and test procedures were used.

The participant's classroom was a self-contained special education preschool in an elementary school in a low income, urban neighborhood in the Pacific Northwest. The participant attended the preschool Monday thru Thursday from 12:30 PM to 3:00 PM. The class contained 10 other students with varying levels of functioning. The classroom was staffed with one certified special education teacher and two certified instructional aides, along with three physical therapists on Mondays, two speech and language pathologists on Wednesdays and an occupational therapist on Tuesdays and Thursdays. The participant was typically taught in a connected conference room, or at a back table away from the rest of the group, during varying times of the day. Sessions were short, lasting only about 5 minutes, as the participant fatigued quickly.

Materials

Materials needed for the implementation of this study were the participant's regularly used Flip-and-Talk Picture Communication Board (Mayer-Johnson, 2013), DI flashcards containing the numerals 1 through 10, a data recording sheet (see Table 1), and a pen or pencil.

Dependent Variable and Measurement

The dependent variable was the number of numerals the participant was able to identify by pointing to the correct number on her communication board when verbally told the numeral's name. A correct response in this study was defined as the participant pointing to the corresponding numeral within 5 seconds

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of being told the numeral name without self-correcting in any way. Event recording was used to mark which numerals were correctly identified for each set prior to the beginning of each teaching session. If the student correctly identified the numeral within 5 seconds without self-correcting, the first author marked that numeral with a tally for that session. Numerals that were either not identified or were incorrectly identified were left blank on the data recording sheet.

Experimental Design and Conditions

A multiple baseline design (Kazdin, 2011) was used to evaluate the effectiveness of DI flashcards and model, lead, and test on the acquisition of numeral identification across three sets of numerals (See Table 2). The sets used for intervention can be viewed in Table 2.. Set 1 consisted of numerals 4, 6, and 8; Set 2 contained the numerals 2, 3, and 7; and Set 3 consisted of numerals 5, 9, and 10. Baseline data were taken for each of the three sets for three sessions to determine the participant's present level of performance for identifying numerals using the communication board.

Baseline. The participant and first author stayed in the self-contained special education preschool classroom setting for each baseline session. Both sat at a separate table from the rest of the class while the other students were engaged in other activities. The first author was seated directly next to the participant at a table for each baseline session. The participant was provided with her Flip-and-Talk Picture Communication board, with the numeral tab already open. The first author then randomly identified numeral names by shuffling through the DI Flashcards without letting the participant see them, and saying "Show me (numeral name)." As each numeral was verbally identified, the first author recorded which numerals the participant correctly identified on her communication board by pointing within 5 seconds of being asked. Baseline sessions were taken for each of the three sets for three sessions. After intervention began, baseline was taken for the other two sets in an alternating fashion, along with data taken on the set that was in intervention. For example, for the first intervention session of Set 1, data were taken for Set 1 and Set 2, and for the second intervention session of Set 1, data were taken for Set 1 and Set 3. This was done to reduce the amount of class time required for data collection.

DI flashcards and model, lead, and test. The study took place four days a week This was each the schedule that participant attended her regular preschool program (Monday-Thursday). The first author administered the intervention each day, at a back table away from the rest of the classroom. Each day, data were taken on the set in intervention, and one of the other two sets in an alternating fashion. The first author then decided from these results which on which to work. Only one new numeral was taught each day. The Direct Instruction flashcard system included a deck of all previously mastered numerals and one unmastered numeral. The flashcards were used as a model for the student when the first author stated "This is (numeral name). Show me (numeral name)." If the participant made a mistake on identifying the numeral after being told the name, the first author provided error correction with a model, lead, and test procedure (Marchand-Martella, Slocum, & Martella, 2004). The first author first stated "This is (numeral name)", while pointing to the correct numeral on the participant's picture communication board, then used hand-over-hand physical assistance to prompt the student to point to the correct numeral after saying "Show me (numeral name)", and finally allowed the student to identify the numeral independently after saying "Show me (numeral name)" again. The flashcard would then be set only one card back in the deck and if the participant identified the numeral

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correctly three times in a row, the flashcard was put to the back of the deck.

Mastery of a number was determined when the student correctly identified the numeral for two times in a row. After doing so, the researcher tested the student on all previously mastered and newly mastered numbers once more without the additional visual prompt of the flashcards. If the participant identified all numbers correctly, the session ended for the day. The participant was then praised for hard work and awarded a sticker for the day. Once the student mastered all numbers in a set (correctly identified them for two sessions in a row), the researcher moved on to teaching the next set.

Reliability of Measurement

Inter-observer reliability was conducted three times during baseline and seven times during the DI flashcard system and model, lead, and test intervention. The first author took data during each session. The cooperating teacher (fourth author) served as the reliability observer. . An agreement was defined as both observers scoring the response in the same manner. Any difference in scoring was a disagreement. The percent of inter-observer agreement was calculated by dividing the number of agreements by the number of disagreements plus the number of agreements and multiplying by 100. The percent of inter-observer agreement for whether or not the child said the correct numeral name was 100%.

III. Results

Baseline

Data gathered during both baseline and the intervention period can be viewed in Table 2 and Figure 1. Raw data, as well as raw reliability data can also be viewed after the References section. During the baseline phase for numeral identification, the data showed a consistent trend. The average number of numerals correctly identified for baseline for Set 1 was 1, for Set 2 was 0, and for Set 3 was 0.667 (with a range of 0-2). The participant correctly identified one numeral for the first session (from Set 1), two for the second (one from Set 1, and one from Set 3), and two for the third (one from Set 1, and one from Set 3). The only numeral, consistently identified, was the numeral 1. Numerals 2, and 3 were both correctly identified once. Because of this, it was determined that the numeral 1 was mastered, and was therefore not included in any of the sets to be taught. All other numerals 2-10 were determined to be in need of teaching.

DI Flashcards + Model, Lead, and Test

When the DI flashcard system and model, lead, and test were implemented to teach the participant to correctly identify numerals 2-10. The participant showed improvement with the implementation of the DI Flashcard system and model, lead, and test procedure. The participant showed a strong increasing trend throughout the intervention period. During baseline for Set 1 (which contained four numerals), the student correctly identified an average of 1.3 numerals with a range of 1-2. During intervention, this increased to an average of 3.78 with a range of 3-4. For Set 2 (which contained three numerals), during baseline the student correctly identified an average of 0.33 numerals with a range of 0-2. This increased to an average of 2.83 with a range of 2-3 during intervention. Finally, for Set 3 (which also contained three numerals), the student correctly identified an average of 0.5 numerals with a range of 0-1, which increased to an average of 2.5 with a range of 2-3 during intervention.

IV. Discussion

The results of the study indicated that the combination of the DI flashcard system with the model, lead, and test procedure is an effective method for teaching numeral recognition skills in a nonverbal preschooler

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with developmental delays. A functional relationship was shown between the independent and the dependent variable. For all measures, only one overlapping data point between baseline and DI flashcards was recorded. The intervention used successfully increased the student's ability to recognize all numerals from 1-10 from an average of 23% accuracy for baseline, to an average of 90% accuracy for the final three sessions. Experimental control was demonstrated by the multiple baseline design of the intervention.

During intervention, the student did show signs of fatigue very quickly for each lesson. However, she was extremely motivated by both the adult attention she was receiving and the potential to learn in all lessons. This appeared to counteract the fatigue she displayed, and allowed her to learn and acquire the skill in spite of it.

Based on the quick acquisition of the skill, the participant should continue to be taught using this method of intervention and should move into higher numerals 11-20. The ability to recognize these numerals should help promote future math and life skills. Opportunities for maintenance and generalization should also be provided to the student by asking her to demonstrate her numeral recognition skills in other areas and other activities throughout the classroom. For example, numeral recognition skills are pertinent in reading calendars and clocks, as well as other academic areas such as rational and rote counting opportunities. By expecting numeral recognition in these areas as well, the student will both generalize the skill to other locations and skill areas, as well as maintaining the skill over time.

The major strength of the study was the success of the intervention with our participant in the target skill of numeral recognition. In addition the procedures were practical to implement and evaluate.. The procedure was very basic and did not take up much time, with the entire procedure including both data collection and intervention lasting about 10 minutes per session. Because of this, it did not disrupt the student's school day routine or take away from any other crucial learning tasks. The materials were also inexpensive and easy to make. The only materials necessary were the handmade flashcards with numerals 1-10 on them, and the handmade data collection sheet. The procedure was carried out without any major problems or setbacks. Another strength of the study was that the student was motivated by the learning she was doing. Each day, she was excited and eager to get started. When asked if she enjoyed learning numbers, she also signed yes or nodded. The student was provided feedback of her performance on a daily basis. Because of her cognitive and communication delays, she was unable to have spontaneous conversation about the intervention and her progress. However, she was informed that she was learning numbers and that she was working hard to be successful.

There were weaknesses in the present case report. First, it took place in a one-on-one setting. Second, because the student was nonverbal and there were no other nonverbal students in the classroom, the DI flashcard system had to be modified to include the additional visual prompts and the model, lead, and test procedure. This may not have been as effective for a verbal student to point to the correct answer. Participants are typically expected to verbally respond when a flashcard is presented (Bulkley et al., 2012; Skarr et al., in press; Travis et al., 2012). Third, employing DI flashcards in a small group instructional setting, would have been beneficial to provide peer models and additional practice by having to hear or watch another students doing well with DI flashcards.

The present outcomes replicate and extend the research of our research efforts (Brasch et al., 2008; Ehlers et al., 2012; Hayter et al., 2008; Herberg et al., 2011; Higgins, McLaughlin, Derby, & Long, 2012; Houglum

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et al., 2013; Skarr et al., in press). In the present case report, the use of DI flashcards was extended to a young student with severe issues in language development. Also, the format of DI flashcards could be manipulated to allow this student to point rather than say her answers. This provides some additional flexibility for employing DI flashcards. We have been able to use such a procedure when teaching students to become peer tutors in preschool classrooms (Balenzano, Agate, McLaughlin, & Howard, 1993; Tabacek, McLaughlin & Howard, 1994).

Unlike some of our prior research with preschool students where the outcomes were either gradual or not as pronounced (Ehlers et al., 2012; Higgins et al., 2012; Pierce, McLaughlin, Neyman, & King, 2012), the present outcomes showed a clear functional relationship between the implementation of DI flashcards and changes in student performance. This finding was also found with Herberg et al., (2011) and Mangundayo et al. (2013) with young children in special education preschool classroom settings.

The present outcomes add to the growing body of evidence as to the efficacy of employing DI flashcards with its model, lead, and test, error correction. Typically we have found greater performance gains when our participants were older than preschoolers (Brasch et al., 2008; Cole, McLaughlin, & Johnson, 2012; Hayter et al., 2008; Houglum et al., 2013; Skarr et al., in press). Clearly, more research on this issue should occur.

Finally, the first author was pleased with the results of the intervention and the gains made by the student. In order to encourage the student to maintain the skills and learn further, she was provided with a set of DI flashcards to take home, along with directions for her family on the implementation of the procedure.

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REFERENCES

Balenzano, S., Agate, L. J., McLaughlin, T. F., & Howard, V. F. (1993). Training tutoring skills with preschool children with disabilities in a classroom setting. *Child & Family Behavior Therapy, 15*(1), 1-36.

Bowey, J. A., McGuigan, M., & Ruschena, A. (2005). On the association between serial naming speed for letter and digits and word-reading skill: towards a developmental account. *Journal of Research in Reading, 28,* 400-422.

Brasch, T. L., Williams, R. L., & McLaughlin, T. F. (2008). The effects of a direct instruction flashcard system on multiplication fact mastery by two high school students with ADHD and ODD . *Child & Family Behavior Therapy, 30*(1), 51-59.

Bulkley, L., McLaughlin, T. F., Neyman, J., & Carosella, M. (2012). The effects of a model, lead, and test procedure to teach letter name and sound identification to elementary school students with learning disabilities. *Electronic International Journal of Educational Research, 3*(4), 50-64. Retrieved from: http://www.e-ijer.com/

Cole, M., McLaughlin, T. F., & Johnson, R. (2012). The effects of direct instruction flashcards with oral sentence creation on the spelling accuracy of three middle school students with disabilities. *International Journal of Basic and Applied Science, 1*(2), 308-319. Retrieved from: http://www.insikapub.com/

Crowley, K., McLaughlin, T. F., Kahn, R. (2013). The effects of direct instruction

flashcards, reading racetracks on sight word skills for two elementary students with autism. *Journal of Developmental and Physical Disabilities*, *26*, 297-316.

Ehlers, E., McLaughlin, T. F., Derby, K. M., & Rinaldi, L. (2012). The differential effects of direct instruction flashcards and math racetrack on number identification for three preschool students with disabilities. *Academic Research International*, *2*(3), 285-295. Retrieved from: http://174.36.46.112/~savaporg/journals/issue.htm/

Fitting, E., McLaughlin, T. F., Derby, K. M., & Blecher, J. (2013). The effects of DI flashcards with a DI discrimination and match to sample on letter identification for four preschool students with documented developmental delays. *International Journal of English and Education*, *2*(2), 495-517. Retrieved from: Retrieved from: http://www.ijee.org/.

Flip 'n talk (n.d.). Pittsburg, PA: Mayer/Johnson.

Goin-Kochel, R. P., Myers, B. J., Hendricks, D. R., Carr, S. E., & Wiley, S. B. (2007). Early responsiveness to intensive behavioural intervention predicts outcome among preschool children with autism. *International Journal of Disability Development and Education*, *54*, 152-175.

Hayter, S., Scott, E., McLaughlin, T. F., & Weber, K. P. (2007). The use of a modified direct instruction flashcard system with two high school students with developmental disabilities. *Journal of Physical and Developmental Disabilities*, *19*, 409-415.

Herberg, K., McLaughlin, T. F., Derby, K. M., & Gilbert, V. (2011). The effects of direct instruction flashcards on shape recognition and recall for two preschool students with disabilities. *Academic Research International*, *1*(3). 55-59. Retrieved from: http://174.36.46.112/~savaporg/journals/issue.html

Higgins, M., McLaughlin, T. F., Derby, K. P., & Long, J. (2012). The differential effects of direct instruction flashcards on sight-word identification for two preschool students with autism spectrum disorders. *Academic Research International*, *2*(3), 394-402. Retrieved from: http://174.36.46.112/~savaporg/journals/issue.html

Houglum, R., McLaughlin, T. F., Weber, K., Neyman, J., & Gould, C. (2013). The effectiveness of direct instruction flashcards with guided practice activities to instruct two elementary students diagnosed with autism spectrum disorder and delays in pre-academics and communication. *International Journal of Basic and Applied Science*, *2*(1). 11-37. Retrieved from: http://www.insikapub.com/

Kazdin, A. E. (2011). *Single case research designs: Methods for clinical and applied settings* (2nd. ed.). New York, NY: Oxford University Press.

Kerka, S. (1995). *Not just a number: Critical numeracy for adults* (ERIC Digest No. 163). Columbus, OH: ERIC Clearinghouse on Adult Career and Vocational Education. (ERIC Document Reproduction Service No. ED385780).

Mangundayao, J., McLaughlin, T. F., Williams, R. L., & Toone, E. (2013). An evaluation of a direct instructions flashcard system on the acquisition and generalization of numerals, shapes, and colors for preschool-aged students with developmental delays. *Journal of Developmental and Physical Disabilities*, *26*, 461-473.

Mann, Z., McLaughlin, T. F., Williams, R. L., Derby, K. M., & Everson, M. (2012). The effects of direct instruction flashcards and rewards with math facts at school and in the home: acquisition and maintenance. *Journal of Special Education Apprenticeship*, 1(2). Retrieved from: http://josea.info/index.php?page=archives.

Pierce, K., McLaughlin, T. F., Neyman, J., & King, K. (2012). The gradual and differential effects of direct instruction flashcards with and without a DRH contingency on basic multiplication facts for two students with severe behaviors disorders. *i-manager's Journal on Educational Psychology*, 6(2), 35-44. Retrieved from: http://www.imanagerpublications.com/Archives.aspx

Skarr, A., Zielinski, K., Ruwe, K., Sharp, H., Williams, R. L., & McLaughlin, T. F. (in press). The effects of direct instruction flashcard and math racetrack procedures on mastery of basic multiplication facts by three elementary school students. *Education and Treatment of Children*.

Standish, K., McLaughlin, T. F., & Neyman, J. (2012). The effects of direct instruction flashcards and math racetrack on math facts with one elementary student. *Academic Research International, 2*(2), 241-246. Retrieved from: http://174.36.46.112/~savaporg/journals/issue.html

Tabacek, D. A., McLaughlin, T. F., & Howard, V. F. (1994). Teaching preschool children with disabilities tutoring skills: Effects on preacademic behavior. *Child & Family Behavior Therapy, 16*(2), 43-63.

Why math is so important. (2010). Retrieved from http://diplomaguide.com/articles/why_Math_is_So_Important.html

Table 1. This table displays the results from each baseline and teaching session. The numerals which were correctly identified during each day's pretest were marked with an "X".

	Set 1				Set 2			Set 3		
	1	**4**	**6**	**8**	**2**	**3**	**7**	**5**	**9**	**10**
Baseline	X					X	X			
Baseline	X			X						
Baseline	X									X
Session 1	X	X		X						
Session 2	X	X	X	X					X	
Session 3	X	X	X	X				X		
Session 4	X	X	X	X	X	X	X			X
Session 5	X	X	X	X	X	X	X			
Session 6	X	X	X	X	X	X	X		X	X
Session 7	X	X	X	X		X	X		X	X
Session 8	X	X	X	X	X	X	X	X	X	X
Session 9	X	X		X	X	X	X	X	X	X

Table 2. This table shows the three sets with the numerals that were taught in each.

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Set 1	Set 2	Set 3
1	2	5
4	3	9
6	7	10
8		

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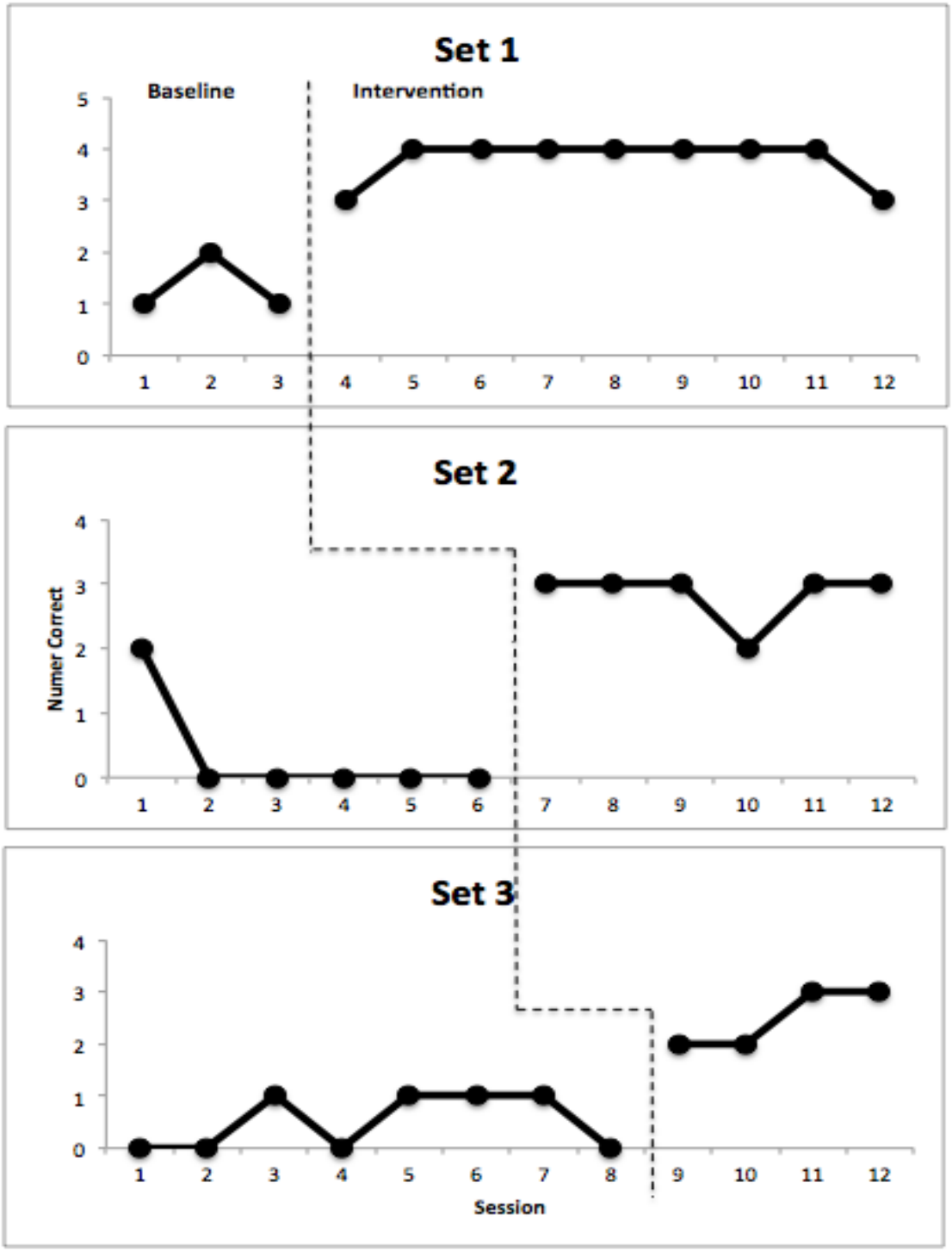

Figure 1. The pretest data taken at the beginning of each session for Sets 1-3 during Baseline and DI flashcards and MLT (Intervention). The dotted line separates baseline from intervention for each set, and the number of numerals correctly identified during each day's pretest are shown.

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