World Wide Journal of Multidisciplinary Research and Development

WWJMRD 2016; 2(1): 53-58
www.wwjmrd.com
e-ISSN: 2454-6615

Lauren Thompson
Department of Special Education Gonzaga University, Washington, United States

T. F. McLaughlin
Department of Special Education Gonzaga University, Washington, United States

K. Mark Derby
Department of Special Education Gonzaga University, Washington, United States

Carol Antcliff
Spokane Public Schools, Washington, United States

Correspondence:
T. F. McLaughlin
Department of Special Education Gonzaga University, Washington, United States

The delayed and differential effects of direct instruction flashcards and the *reading mastery program* to teach letter sounds to a six-year-old girl with PDD-NOS

Lauren Thompson, T. F. McLaughlin, K. Mark Derby, Carol Antcliff

Abstract
The ability to recognize letter sounds is a crucial prerequisite for reading, which is a lifelong skill. The purpose of the present study was to evaluate the effects of Direct Instruction (DI) flashcards and the *Reading Mastery* program to teach a six-year old girl letter sounds. The participant was a six year old boy in a self-contained Designed Instruction classroom for five, six, and seven year olds. A multiple baseline design across letter sounds was employed. The overall outcomes indicated that Direct Instruction flashcards paired with Reading Mastery was successful in teaching a child with PDD-NOS and cognitive delays to recognize letter sounds.

Keywords: Direct Instruction Flashcards, Reading Mastery, PDD-NOS, Multiple Baseline Design, Single Case Research, Classroom Research, Applied Behavior Analysis, Direct Instruction

Introduction
Phonemic awareness is an important skill that is typically taught when children first begin school. This skill is crucial for young students to learn because it is a prerequisite skill for reading. Phonemic awareness is the ability to hear and manipulate the sounds in spoken words, and the understanding that spoken words and syllables are made up of sequences of speech sounds (Yopp, 1992). Without understanding the sounds that each letter represents, children will drop behind their peers in their reading and literacy levels. Early instruction should also teach students how to blend sounds to create and read words. Blending known sounds is the basis for having students sound out words while reading. Reading is such an important skill because it is essential for school, work, and pleasure. According to the U.S. Department of Education, 32 million adults in the United States are illiterate (Adams & Engelmann, 1996, 2000, 2004, 2007). Children need to be taught the basic reading skill such as phonemic awareness at an early age. Reading, as well as, being able to form coherent sentences while writing is a huge form of communication. Phonemic awareness is a major indicator of which children will be successful readers. Research states, “The best predictor of reading difficulty in kindergarten or first grade is the inability to segment words and syllables into constituent sound units (phonemic awareness)" (Lyon, 1995).

A variety of other procedures have been used to teach students their letter sounds. Such procedures have included: (a) *Teach your Child to Read in 100 Easy Lessons* (Engelmann, Haddox, & Bruner, 1988; McCullough, Weber, Derby, & McLaughlin, 2008), (b) reading racetracks (Erbey, McLaughlin, Derby, & Everson, (2011) and (c) phonics practice such as sound cards with error correction procedures (Bulkley, McLaughlin, Neyman, & Carosella, 2012).

Direct Instruction (DI) flashcard procedures focus explicit teaching to promote mastery of the desired skills (Brasch et al., 2008 Silbert, Carnine, & Stein, 2001; Shapiro, 2011). DI flashcard procedures for reading focuses on a specific area within reading such as sounds, sight words, vocabulary, spelling, and various other discrete skills. Direct Instruction flashcard procedure requires a set flashcards with a basic target letter on each card such as the letter “a.” The academic skills being taught are placed on flashcards. Which materials are typically determined through pretesting.

Both correct as well as errors from the pretest are placed on flashcards (Brasch et al., 2008). These flashcards are then placed into sets or stacks. The tutor or teaching shows the card and the student must respond orally or in writing as to what is on the flashcard within 3 to 5 seconds. If the child answers the problem or word correctly, that flashcard is placed at the bottom of the stack and the next flashcard is presented. If the student makes an error, the model, lead, and test procedure (Marchand-Martella et al. 2004) is carried out. This requires that the instructor to say the correct response when the flashcard presented. Next, the student and teacher then said the correct answer together. Finally, the flashcard is presented again to the student. If the student made correct response, this card is placed from three to five cards from the top of the stack to provide the student additional opportunities to practice their errors correctly (Silbert et al., 1981). This procedure was developed to teach basic math facts. However, since that time it has received attention in the peer reviewed literature to students with and without disabilities. The skills taught have included sight words (Romjue, McLaughlin, & Derby, 2011), letter names or sounds (Bulkley, McLaughlin, Derby, & Carosella, 2012; Fitting, McLaughlin, Derby, & Blecher, 2012; Ruwe, McLaughlin, Derby, & Johnson, 2011; basic math facts (Glover, McLaughlin, Derby, & Gower, 2011; Pfaff, McLaughlin, Neyman, & Everson, 2013), pre-academic skills such as numeral identification, colors and shapes (Mangundayo, McLaughlin, Williams, & Toone, 2013). DI flashcards have also been successfully employed across a wide age range of students as well as disability designations. These have ranged from elementary students with autism (Crowley, McLaughlin, & Kahn, 2013), preschool students with developmental delays (Fitting et al., 2012; Mangundayo et al., 2013), middle school students with intellectual disabilities (Ruwe et al., 2011), students with severe behavior disorders (Brasch et al., 2007; Pierce, McLaughlin, Neyman, & King, 2012) or intellectual disabilities (Hayter, Scott, Weber, & McLaughlin, 2007).

Direct Instruction flashcard procedure focuses on active student responding to promote mastery of the desired skill (Brasch et al., 2008; Shapiro, 2011; Skarr, Zielinski, Ruwe, Sharp Williams, & McLaughlin, 2014). DI flashcard procedure for reading focuses on a specific skill area within reading such as sounds, sight words, vocabulary, and other skills that need to be taught so the student is fluent. Direct Instruction flashcard procedure involves a set flashcards with a basic target letter on each card (e.g. a). Previous studies found this procedure to be extremely effective in improving the targeted skill (Brasch, Williams, & McLaughlin, 2008; Shapiro, 2011). The Direct Instruction procedure has shown effective in maintaining the skill long after the study has been completed (Gersten, Keating, & Becker, 1988; Hopewell, McLaughlin, & Derby, 2011; Lapke & McLaughlin, 2015; Ruwe, McLaughlin, Derby, & Johnson, 2011)

Reading Mastery (Engelmann et al., 1988) is a reading curriculum developed for use in special as well as general education. This reading curriculum is scripted to provide the teacher with a specific set of procedures to implement to teach reading. This curricula that been shown to be highly effective in teaching a wide range of students (Engelmann, 2000; Schieffer, Marchand-Martella, Martella, Simonsen, & Woldron-Soler, 2002).

The purpose of this study was to evaluate the effectiveness of DI flashcards and the *Reading Mastery* Program on teaching a student with PDD-NOS letter sounds. The goal of the study was to have the participant increase her letter sound recognition. There have been numerous studies on the effectiveness of DI flashcards and the Reading *Mastery Program* (Engelmann & Hanner, 2008).

Method

Participant and Setting

The participant was a six year-old girl that was diagnosed with Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS). She was academically and emotionally behind her peers in general education. “The term "pervasive developmental disorders," also called PDDs, refers to a group of conditions that involve delays in the development of many basic skills. Most notable among them are the ability to socialize with others, to communicate, and to use imagination” (Pervasive Developmental Disorder). The participant also lived with her biological parents, brother, and new born sister. Her parents were not very involved in her education. Through the school, the participant received time in occupational therapy as well as speech.

The participant had been in a special education preschool the previous year. The child was moved up to a self-contained Designed Instruction classroom for 5, 6, and 7 year olds. The class met Monday through Friday from 9:00-2:45 in a low-income urban elementary school in the Pacific Northwest. There were a total of ten children in the class. The study was usually conducted after the participant’s lunch from 1:00-1:30. The participant was either taken into the hall or to the back of the classroom to conduct the study. This classroom’s personnel has been employed in additional research documenting the ability of teacher candidates to meet accreditation standards from the State as well as from national accrediting bodies (Membrey, McLaughlin, Derby, & Antcliff, 2011).

Materials

The materials used in this study included DI Flashcards containing each letter sound. The student was given sets of letter sounds given the verbal prompt, “what sound?” The author also used the Reading Mastery program (Engelmann & Hanner, 2008) with the participant. The author would go through the Reading Mastery book one lesson per session and read the teacher directions. The participant would respond to the teacher’s directions. The participant then completed the worksheet that corresponded with each lesson with some guidance from the author.

Dependent Variable and Measurement

The pretest showed that before the study, the participant did not know or recognize her letter sounds. The dependent variable for this study was the participant saying the letter sound when presented a flashcard with a sound on it. The participant had to say the correct sound within 5 seconds for the response to be correct.

At the beginning of each session, the researcher would present the flashcards in each set. If the participant said the correct sound within five seconds or self-corrected in five seconds, the research would write a plus on the data sheet by the sound. If the participant did not say the correct within five seconds, the researcher would write a minus on

the data sheet next to the sound. Interobserver agreement was conducted once during baseline and 17 out of 17 times during the intervention. Interobserver agreement was calculated by having a colleague of the first author independently determine the number of correct and incorrect responses. The first author's data were compared to the data of the colleague to determine the percent of interobserver agreement. The percent of sessions that had interobserver agreement was 88%. The average interobserver agreement was 84%.

Experimental Design and Conditions

The study used a multiple baseline design across sets of letter sounds (Kazdin, 2011; McLaughlin, 1983). A description of each condition follows.

Baseline: During baseline, the participant was presented with DI flashcards containing the 44 letter sounds. The flash cards were presented one by one. The first author verbally prompted the participant by saying, "what sound?" No specific praise was given during baseline. The student received general praise for participating after the session.

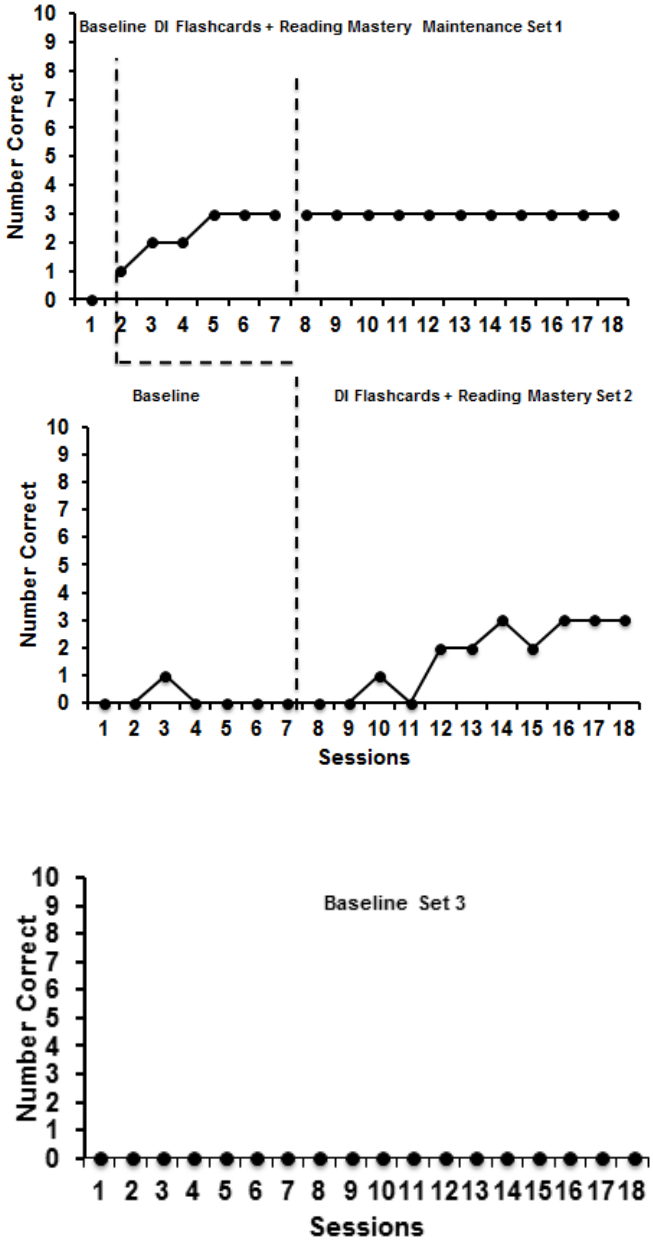
DI flashcards and Reading Mastery on the recognition of letter sounds: Following baseline, the participant received the Direct Instruction Flashcard and Reading Mastery program intervention. At the beginning of each session, the instructor would drill the letter sounds in the set the student was working on mastering. If the participant said the correct sound on her first try, the card was removed from the pile. If the participant said the incorrect sound, did not respond within 5 seconds, or said I don't know; the instructor would say the correct sound and then ask the participant what sound. The participant then had to say the correct sound three times before the card was removed from the deck.

Once the student had gotten all of the DI flashcards in the specific set correct, the instructor presented from the Reading Mastery Presentation Book. Each lesson in the book reviewed previously taught letter sounds and introduced a new letter sound every couple of lessons. Reading Mastery reinforced the letters sounds that had been presented in the DI flashcards and followed the same introduction order as the flashcards. For example, when introducing the sound /d/, "This is the sound /d/. My turn to say it. Listen, /d/. Now you say it, get ready." The Reading Mastery program had the student repeatedly practice the new sound. If the student did not say the sound correctly, the instructor would do a correction model, lead, test procedure. The instructor would say the sound. Then student said the sound. The student was then tested and retested on the sound. Once the student said the sound correctly three times. When using Reading Mastery, the student discriminate between the new letter sound and previously taught sounds.

Once the student completed the lesson with verbal responses, she was given a take-home sheet that corresponded to the lesson presented that day. The student would complete the take home during the session with help from the instructor when need. The take home started with the student having to recognize and say the letter sound that had been introduced in the lesson. The student then had to trace and write the letter as well as previously taught letters. Next the worksheet reinforced discriminating the newly introduced letter sound from previously introduced sounds (see attached). At the beginning of each new session, the participant was tested on the flashcards of the current set without any feedback.

Results

The results of this study are displayed in Figure 1. For Set 1, the mean number of correct responses during baseline was 0. The mean number of correct responses during the DI flashcard and Reading Mastery intervention was 2.76 (range was 0-3). The number of correct responses during Set 2 baseline was 1.0. The mean number of correct responses for DI flashcards and Reading Mastery increased slightly to an average of 1.72 (range was 0-3). The number of correct responses during Set 3 baseline was 0. The number of correct responses during Set 4 baseline was 0. The number of correct responses during Set 5 baseline was 2.0.



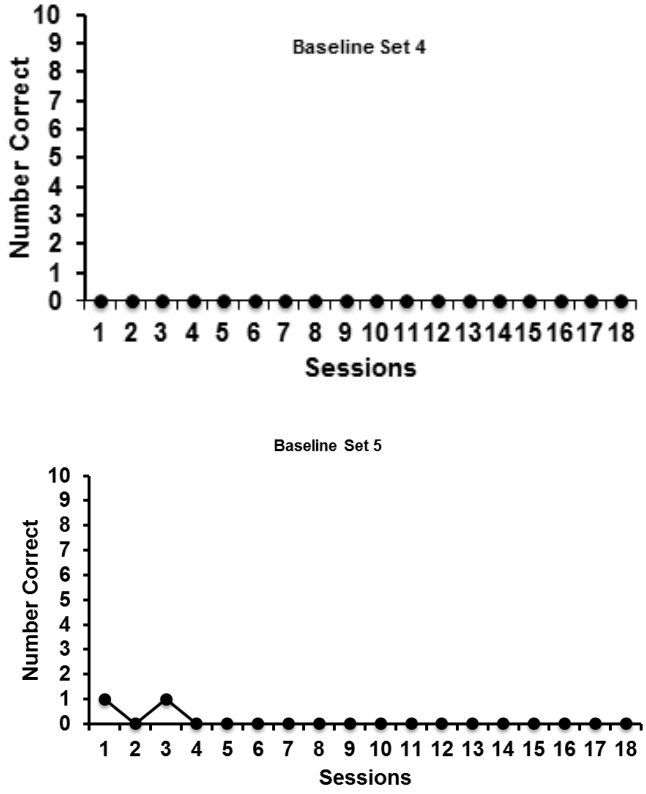


Fig 1: The number of correct letter sounds for baseline, DI flashcards and Reading Mastery for our participant across Sets 1-4

Discussion

Although the first author was only able to intervene with Sets 1 and 2, the participant made improvements in her recognizing of letter sounds. Prior to the DI flashcards and Reading Mastery, our participant could not recognize any letter sounds consistently. During the pretest, the participant only recognized the sound /o/. However, when the fist author took baseline data on the set /o/ was placed, the participant never was able to make the sound correct again.

The intervention of the DI flashcards and *Reading Mastery* (Engelmann et al., 1988) was shown to be successful with just Sets 1 and 2. The student mastered all the sounds in Set 1 and Set 2. In addition, she could recognize those sounds in a word. The student could discriminate these six sounds from other sounds.

The student had a hard time focusing on the tasks when presented. This was especially apparent when the first author first started working with the student. However, once rapport was established between the student and first author, she worked more cooperatively with the first author. About half way through the research, the setting for the sessions changed. The researcher started working with the participant in the hallway. This proved to be too distracting for our participant. Then the sessions were conducted in the back of the participant's self-contained special education classroom. The student had better focus when the session was moved into the classroom. Also, specific verbal praise, high fives, and access to the classroom iPad were used as reinforcers for the participant. Offering the iPad as a reward was the students biggest reinforce and helped her focus and attend to the task.

One strength of this study was that the student showed mastery of six letter sounds. The student could discriminate these six sounds from other sounds. The study was also efficient and effective, easy to implement, and the flashcards were costless. The participant also enjoyed working one-on-one with the researcher because she was attention maintained.

A weakness of this study was that the first author was unable to work with the student everyday. This was the main reason that the sounds in Sets 3-5 were never taught. The participant was also not assessed on the weekends or over a five-day holiday break. An additional weakness was the initial lack of robust effects. We have found this in some of our previous research with young preschool students when using DI flashcards (Higgins et al., 2012; Hillier, McLaughlin, Derby, & Scarborough, 2014). Recently with elementary school students (Heric, McLaughlin, Derby, & Everson, 2016). As before, such outcomes continue to warrant further analysis. The present outcomes replicate much of our prior research using DI flashcards to teach letter recognition and letter sounds (Bechtolt et al., 2014). Additional research carried out by other researchers in different settings needs to occur.

Acknowledgements

This research was completed in partial fulfillment for an Endorsement in Special Education from Gonzaga University and the State of Washington. The first three authors would like to thank the participant, and the fourth author, for their cooperation. Ms. Thompson now is a special education teacher in the Seattle Public Schools, Seattle, WA.

Requests for reprints should be sent to Lauren R. Thompson, Seattle Public Schools, Special Education Program, Seattle Public Schools, 2445 3rd Ave. S, Seattle, WA

References

1. Adams, G. L., & Engelmann, S. (1996). *Research on Direct Instruction: 25 years beyond DISTAR*. Seattle, WA: Educational Achievement Systems
2. Bechtoldt, S., McLaughlin, T. F., Derby, K. M., & Blecher, J. (2014). The effects of direct instruction flashcards and a model, lead, and test procedure on letter recognition for three preschool students with developmental disabilities. *Journal on Developmental Disabilities, 20*(1), 5-15.
3. 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*, 51-59.
4. 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/
5. Crowley, K., McLaughlin, T. F., & Kahn, R. (2013). The effects of direct instruction flashcards, reading racetracks on sight word skills for two students with autism. *Journal of Developmental and Physical Disabilities, 26*, 297-311.
6. Engelmann, S. (2000). About reading—A comparison between *Reading Mastery* and *Horizons*. *Effective*

School Practices, 18(3), 15 –26.
7. Engelmann, S. (2004). Foreword. In N. E. Marchand-Martella, T. A. Slocum, R. C. Martella (Eds.), *Introduction to Direct Instruction* (pp. xix-xxvi). Boston, MA: Pearson Education, Inc.
8. Engelmann, S. (2007). *Teaching needy kids in our backward system: 42 Years of trying*. Eugene, OR: ADI Press
9. Engelmann, S., Haddox, P., & Bruner, E. (1988). *Teach your child to read in 100 easy lessons*. New York, NY: Simon & Schuster.
10. Engelmann, S., & Hanner, S. (2008). *Reading mastery III*. Chicago, IL: Science Research Associates.
11. Erbey, R., McLaughlin, T., Derby, M., & Everson, M. (2011, July 1). The effects of using flashcards with reading racetrack to teach letter sounds, sight words, and math facts to elementary students with learning disabilities. Retrieved December 5, 2014, from http://www.iejee.com/3_3_2011/3_3_213_226.pdf.
12. Fjortoft, A., McLaughlin, T. F., Derby, K. M., Everson, M., & Johnson, K. (2014). The effects of two Direct instruction teaching procedures to teach basic skills to two students with disabilities. *Multidisciplinary Journal of Education Psychology*, *4*(2), 1-32. Retrieved from: http://dx.doi.org/10.447/remie.2014.09
13. Glover, P., McLaughlin, T. F., Derby, K. M., & Gower, J. (2010). Using a direct instruction flashcard system employing a back three contingency for errors with two students with learning disabilities. *Electronic Journal of Research in Educational Psychology, 8*(2), *457-482*. Retrieved from http://www.investigacion-psicopedagogica.org/revista/new/english/anteriores.php
14. Heric, K., McLaughlin, T. F., Derby, K. M., Weber, K. P., & Everson, M. (2016). The delayed effects of repeated reading and direct instruction flashcards for a 10-year-old elementary school student with learning disabilities. *World Wide Journal of Multidisciplinary Research and Development, 2*(1), 6-11. Retrieved from: http://wwjmrd.com/vol%201/issue%206/issue%206.html
15. Hillier, K. R., McLaughlin, T. F., Derby, K. M., & Scarborough, S. (2014). The effects of direct instruction flashcards and a color racetrack to see basic colors to three preschool students: A failure to replicate for two participants. *International Journal of English and Education, 3*(4), 387-397. Retrieved from: http://www.ijee.org/current_issue
16. Hopewell, K., McLaughlin, T. F., & Derby, K. (2011). The effects of reading racetrack with direct instruction flashcards and a token system on sight word acquisition for two primary students with severe conduct disorders. *Electronic Journal of Research in Educational Psychology*, *9*, 693-710. Retrieved from http://www.investigacion-psicopedagogica.org/revista/new/english/anteriores.php
17. Johnson, C., McLaughlin, T. F., Derby, M. K., Barretto, A., & Bucknell, W. (2014). The effects of direct instruction flashcards and computer time to teach sight words to an elementary student with a learning disability and ADHD: A failure to demonstrate a functional relationship, *International Journal of English and Education, 3*, 581-584. Retrieved from: Retrieved from: Retrieved from: http://www.ijee.org/.
18. Kazdin, A.E. (2011). *Single case research designs: Methods for clinical and applied settings* (2nd.ed.). New York, NY: Oxford University Press.
19. Lapke, M., & McLaughlin, T. F. (2015). The effects of direct instruction flashcards to increase number recognition for a five-year-old general education ell student. *World Wide Journal of Multidisciplinary Research and Development, 1*(6), 6-11. Retrieved from: http://wwjmrd.com/vol%201/issue%206/issue%206.html
20. Lyon, G. R. (1995). Toward a definition of dyslexia. *Annals of Dyslexia, 45*, 3-27.
21. 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.
22. Marchand-Martella, N., Slocum, T., & Martella, R. (2004). *Introduction to direct instruction*. Upper Saddle River, NJ: Merrill/Prentice-Hall.
23. McCullough, D., Weber, K. P., Derby, M. K., & McLaughlin, T. F. (2008). The effects of Teach Your Child to Read in 100 Easy Lessons on the acquisition and generalization of reading skills with a primary student with ADHD/PI. *Child & Family Behavior Therapy, 30*(1), 61-68.
24. McLaughlin, T. F. (1983). An examination and evaluation of single subject designs used in behavior analysis research in school settings. *Educational Research Quarterly, 7*, 35-42.
25. McLaughlin, T. F., Williams, B. F., Williams, R. L., Peck, S. M., Derby, K. M., Bjordahl, J. M., & Weber, K. M. (1999). Behavioral training for teachers in special education: The Gonzaga University program. *Behavioral Interventions, 14*, 83-134.
26. Pfaff, E., McLaughlin, T. F., Neyman, J., & Everson, M. (2013). The effects of direct instruction flashcards with math racetrack with addition facts for an elementary school student with ADHD. *International Journal of Basic and Applied Science*, *2*(1), 124-130. Retrieved from: http://www.insikapub.com/
27. Romjue, H., McLaughlin, T. F., & Derby, K. M. (2011). The effects of reading racetracks for teaching sight words. *Academic Research International, 1*(2), 134-146. Retrieved from: http://174.36.46.112/~savaporg/journals/issue.html
28. Ruwe, K., McLaughlin, T. F., Derby, K., & Johnson, J. (2011). The multiple effects of direct instruction flashcards on sight word acquisition, passage reading, and errors for three middle school students with intellectual disabilities. *Journal of Developmental and Physical Disabilities, 23*, 241-255.
29. Sante, A., McLaughlin, T. F., & Weber, K. P. (2001). The use and evaluation of a Direct Instruction flash card strategy on multiplication math facts mastery with two students with developmental disabilities and attention deficit hyperactivity disorder. *Journal of*

Precision Teaching & Celeration, *17*, 68-75.
30. Schieffer, C., Marchand-Martella, N., Martella, R. Simonsen, F., & Woldron-Soler, K. (2002). *Journal of Direct Instruction, 2*, 87-119.
31. Shapiro, E. S. (2011). *Academic skills problems: Direct assessment and intervention* (4th ed.). New York, NY: Guilford Press.
32. Silbert, J., Carnine, D. W., & Stein, M. (1981). *Direct instruction mathematics*. Columbus, OH: Charles E. Merrill.
33. Skarr, A., Zielinski, K., Ruwe, K., Sharp, H., Williams, R. L., & McLaughlin, T. F. (2014). 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*, *37*, 77-93.
34. Yopp, H. K. (1992). Developing phonemic awareness in young children. *Reading Teacher*, *45*, 696-703.