

THE EFFECTS OF READING RACETRACKS AND FLASHCARDS FOR TEACHING OF SIGHT WORDS

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ABSTRACT

The purpose of this study was to assess the effects of pairing reading racetracks and flashcards for teaching of sight words. Two male elementary school male students served as our participants. The first participant was diagnosed with a specific learning disability, and the second participant was diagnosed with mild intellectual disabilities. Data were taken on the number of corrects and errors from selected sight words. A reversal design with follow up probes was used to evaluate the reading racetrack and flashcard intervention. The results found that reading racetracks paired with flashcards were effective in increasing sight word reading. These outcomes were replicated across each participant and each phase of the investigation. The efficacy of employing reading racetracks and flashcards at the classroom level was discussed.

Key words: sight words, elementary students, learning disabilities, intellectual disabilities, correct rate, error rate, classroom research, fluency

INTRODUCTION

Reading is a very important and vital skill. The lack of skills in reading has been linked to a wide variety of life problems (Askov, 1991). These problems have included: (a) failing to complete high school (Chambers, Dunn, & Rabren, 2004); (b) developing behavioral issues (Bennett, Brown, Boyle, Racine, & Offord, 2003; Kauffman, 2008); (c) chronic under or unemployment (Askov, 1991; Livingstone, 1998); (d) poverty (Howard, McLaughlin, & Vacha, 1996); and (e) difficulty with the law (Gersten & Keating, 1987; Gersten, Keating, & Becker, 1988). Therefore, gaining skills in reading has both short term as well as long term benefits for individuals as well as society as a whole (Adams, 1991; Report of the National Reading Panel [NICHHD], 1999a, 1999b).

Reading fluency is recognized as an essential element of every reading program, especially for students who struggle in reading (Hudson, Lane, & Pullen, 2005). In 2000, the National Reading Panel found that fluency is one of the critical factors necessary for reading comprehension, and is often a component neglected many of today's classrooms.

Quick and effortless word identification in a fluent reader is important because if one can read words automatically, one's cognitive resources can be used for comprehension (National Institute of child Health and Human Development, 1999a, 1999b).

Reading racetracks have shown to be effective and easy to implement for students with reading abilities above or below grade level (Rinaldi, Sells, & McLaughlin, 1997). Reading racetracks are an instructional strategy that focuses on improving fluency. A variety of materials can be used such as lists of Dolch Sight Words, words from passages of reading texts, trade books, word lists, vocabulary lists, etc. can be placed on a reading racetrack. These words should be carefully selected to avoid having any two words on a particular racetrack that were either auditorily or visually similar. There were two different types of racetracks, each containing 28 cells. The first type of racetrack consists of seven target sight words that are repeated in random order. The random order is used to avoid the occurrence of patterns which may interfered with the students learning the words and instead focusing on and learning the pattern in which the words appeared. Every fifth racetrack is a review racetrack containing the accumulation of the 28 different words that were introduced in the four previous racetracks. Two measures are taken. The first is the number of words read correctly from the reading racetrack during a 1-min timing while the second was the frequency of errors during the same 1-min timed reading. An error is not counted if the participant made a self-correction before going on to the next word. When errors are made before the timing of the child, the teacher or teacher's aide must use the "model, lead, test and retest" Direct Instruction procedure (Marchand-Martella, Slocum, & Martella, 2004) to teach or review the words that were missed by the participant. This procedure consists of first modeling the correct pronunciation of the word, then saying the word with the child, the participant then reads the word independently, and finally, the participant is required to reread the word correctly three or more times. This procedure should take approximately 1 to 5 minutes, depending on the number of errors made by the student. At the beginning of each reading session, the participants are given the particular racetrack that he or she was working. The participant is then taught to inform the teacher when he or she was ready to begin. This is followed by the teacher giving the prompt, "On your mark, get set, go!" The teacher keeps track of the number of words read by placing a mark each time the participant completed a full circle around the track. At the end of the 1-min timing, the teacher says "Stop!" The participant and teacher then place a mark the word that was just read. Upon completion of each 1-minute timing, the participant counts the number of words that he or she read and self-records these data. The teacher tallies the number of errors, give this number along with specific feedback to the participant, who then records these data below the number correct. These data are collected and documented by the teacher on a data collection sheet. Often, students plot their own performance after each session is completed.

Reading racetracks have also been shown effective (Rinaldi & McLaughlin, 1996). Also racetrack procedures can be paired with flashcards, to improve sight word recognition (Anthony, Hern, Rinaldi, & McLaughlin, 1997; Falk, Band, & McLaughlin, 2003; Hyde, McLaughlin, & Everson, 2009; McLaughlin, Weber, Derby, Hyde, Violette, Barton et al. 2009; Printz, Band, & McLaughlin, 2006; Rinaldi & McLaughlin, 1996). In addition, research has found that these procedures can assist students in math (Beveridge, Weber, Derby, K. M., & McLaughlin, 2005) and spelling (Arkoosh, Weber, & McLaughlin, 2009).

The present study was implemented to assess reading racetracks and flashcards with two males ages 9 and 11. Both boys had delays in reading, writing, and math. We extended our earlier work by using reading racetracks pairing it with flashcards to increase the accuracy of sight word reading. This study also attempted to replicate and extend the use reading racetracks and flashcards (Anthony et al., 1997; Falk et al., 2003; Printz et al., 2006; Rinaldi & McLaughlin, 1996; Rinaldi et al., 1997) with two pupils with differing ages and disability designations than we have employed in our previous investigations. Our previous research employed students who were younger (10 years)

and diagnosed with just learning disabilities. The present report attempts to provide some initial evidence regarding the efficacy of employing reading racetracks for a student with mild intellectual disabilities.

METHOD

Participants and Setting

There were two participants for this study. The first was a 9-year-old male, who had been diagnosed with a specific learning disability. He was receiving specialized instruction in the areas of reading, writing, and math. The second participant was an 11-year-old male who had been diagnosed with mild intellectual disabilities, and was also receiving specialized instruction in reading, writing, and math. They were chosen based on the recommendation of the classroom teacher and their low achievement scores in reading. Each participant was below grade level in reading when the *Woodcock Johnson Psycho-educational Battery* (Woodcock, McGrew, & Mather, 2001) was administered in the early spring.

Both of the participants attended a self-contained special education classroom for students with developmental delays. Both participants spent part of each school day in the general education classroom for library, art, and physical education. The classroom was located in an upper-low to middle income suburban school in the Pacific Northwest. Sessions were held three to four times a week, lasting between 10 to 20 minutes per session. There were six other students present in the classroom with disabilities. Their disabilities included moderate intellectual disabilities, autism, and fetal alcohol syndrome the time of the investigation. The first author was completing her student teaching in the classroom. The class was staffed by a certified teacher, a student teacher (first author), and one permanent instructional aide.

Materials

A reading racetrack described by Rinaldi et al. (1997) was employed during this intervention. A reading racetrack contains 28 cells placed along an oval track. The words chosen for inclusion on the racetracks came from the pre-primer and primer Dolch word list, as well as the school districts 4th grade core word list; which were placed the sight words on 3x5 index cards. The school districts 4th grade core word lists included the words that all fourth grade students in the district should be able to say and spell. The range of lists reflected the differences in reading skills of our two participants. The flashcards were used to provide additional practice with the word list, as well as a way to present the words during baseline and reversal phases. For data collection and analysis, word lists were typed up for each session on the classroom computer. A digital kitchen timer was used to time student performance on their reading racetrack.

Dependent Variables and Measurement Procedures

The dependent variable was the number of correct and incorrect words. Once the students completed reading their 28-cell racetrack, the number of correct and errors were recorded. A correct was defined as the student correctly saying the written word. An error was defined as the participant saying a word that did not match the pronunciation of the written word, or if the student failed to read the word. An error was not scored if the participants self-corrected themselves before moving on to the next word.

DATA COLLECTION AND INTEROBSERVER AGREEMENT

For data collection, word lists were typed up for each of the sessions enabling corrects and errors to be monitored while each participant read. To keep track of the data session, on the top of each list were the experimental condition, the session number, and the racetrack number. The total number of corrects and errors were recorded on the sheet when the session was completed.

Either the classroom teacher or one of the instructional assistants independently scored the session to obtain interobserver agreement. To calculate interobserver agreement, the smaller number was divided by the larger number and multiplied by 100. The mean agreement was 100% for number of words read by the students. Data were also gathered for the fidelity of the implementation of the reading racetracks procedures. This was completed by having the second and third authors come to the classroom and determine which condition was being implemented. Each employed a checklist that detailed either baseline or the use of the reading racetrack procedures. This was done on three separate occasions with 100% agreement among raters.

EXPERIMENTAL DESIGN AND CONDITIONS

Reading racetracks were evaluated using an ABCABCABCDDDD single case reversal with replications design. (Barlow, Nock, & Hersen, 2008; Kazdin, 2010). A description of the various conditions follows.

Pre-assessment. Before baseline data were taken, a pre-assessment of sight word identification was taken for each participant. The first author was told by the classroom teacher that the first participant was working on pre-primer and primer Dolch words, and that the second participant could read quite a few words from the 4th grade core words list. The first author assessed the first participant on the pre-primer and primer Dolch lists. The participant was asked to read each word on each of the lists. If they came to a word they did not know to try to sound it out, or to skip the word. He correctly read 20 out of the 40 pre-primer word list, and 13 out of 52 primer word list. The words to work on during baseline and intervention would come from these two Dolch lists.

The first author began assessing the second participant's knowledge of the 4th grade core word list. The second participant was asked to do the same as the first participant when reading the words on the lists. He could correctly read 107 out of 150 4th grade core words.

After assessing the number of words the students could read from their lists, reading racetracks were then constructed. Word lists were created using the principle of not introducing words together that were both auditorily or visually similar (Carnine, Silbert, Kameenui, & Tarver, 2004; McLaughlin et al., 2009; Rinaldi et al., 1997). The word lists for both participants consisted of 14 words. A word such as main or mane, man or men would not be placed on the same racetrack. Each list contained 7 unknown words and 7 known words. All racetracks looked the same and only the words that were being trained were included. Once the word lists were created, every word placed on 3x5 inch index cards.

Baseline (B). There was one baseline point taken at the beginning of each new word list, when the word list was presented to each participant. The participant was asked to read 14 flashcards presented to him. We presented the flashcards one-by-one and the participant would have to respond within 5-s. If the participant did not know the word, they could respond by saying "skip." The

participant was provided no feedback on their accuracy. Words were separated into a correct pile and an incorrect pile. After the participant had read through all of the flashcards, the piles were counted and corrects and errors were recorded.

Flashcards and reading racetracks (RR). After baseline data was taken for each word list, instruction on words began with flashcards. The participants were presented flashcard individually. The participants were asked to read the word if they knew it, but if they did not know it, instruction was provided on the word. Specifically, the word was said to model it, and then the participant was asked “What word is this?” The participant read the word, and repeated it several times before proceeding to the next word.

After going through the flashcards two or three times, instruction continued using the reading racetrack. Each word list had two forms of the racetrack, A and B. The two forms of the racetrack were alternated every session to prevent word order memorization. After the track was selected, the first author would point to each word on the track and the student would read the words that were pointed to. The student received praise and feedback about the words. The student read through the track one to two times, or until the student expressed confidence to continue.

Once the participant had read through the racetrack, “a practice timing” was conducted. The student was asked to point to the first word on the racetrack and told, “get ready to read.” During the practice timing, the timer was set to one minute, and the participant was asked to read each word on the racetrack. After the timing was over, the participant reread all the words read incorrectly. We then praised the participant while reading through the racetrack.

Participants typically needed one practice timing, but were allowed more timings if they requested. Once timing was completed, an official timing was conducted to collect the number of correct or incorrect words. During the official timing, the participant did not receive any praise or assistance. While the participant read the words, corrects and errors were recorded. Corrects were marked with a plus sign (+), while errors were scored with a dash (-). After timing was completed, the total number of corrects and errors were tabulated. There were three to five sessions with the reading racetracks for each list, alternated between the A and B forms of the racetrack. In order for the participant to move on to a new list of words, the participant would either have to receive 28 corrects and 0 errors for three sessions in a row or complete five sessions on the same list.

Reversal (RV). After the participant completed three to five sessions of the reading racetracks, the words from flashcards were presented. This was done to determine if the participant could read the words without flashcard instruction or using the reading racetrack. We conducted this reversal during the last data point taken from each of the word lists. This phase was implemented four times.

Review racetrack (RWR). Once four word lists were completed, review sessions were carried out. During review sessions, the participants were asked to read all 28 words that had been the unknown words within the four previous racetracks. There were a total of four review sessions for each participant, regardless of how many corrects or errors each session. This phase lasted of four sessions.

Reinforcement System

During all phases of the investigation, a reinforcement system using the Premack principle (Alberto & Troutman, 2008) was in place. Specifically, all on-task behavior (looking at the teacher, looking at or writing in curriculum materials, raising one's hand for assistance, or correct answers) was followed with verbal praise from the first author. In addition, the participants were given access to desirable consequences that were determined from a preference assessment. Such items as free-time, edibles, computer games, listening to music were provided following the evaluation sessions. The cost of edibles each participant ranged from \$2.50 to \$5.00 for the duration of data collection.

RESULTS

Participant 1.

The number of correct or error words during baseline, reading racetrack intervention plus review tracks, and reversal data points are presented on Figure 1. During baseline for List 1, this participant read 8 words correctly and made 6 errors. Throughout the reading racetrack intervention, he averaged 28 corrects with 0 errors. He finished List 1 by reading all 14 words correctly with no errors. He had 11 corrects and 3 errors during baseline for List 2. Throughout the reading racetrack intervention, he averaged 28 corrects with 0 errors. He completed this word list with 14 words correct and 0 errors. For List 3, he had 9 corrects and 5 errors for baseline. During the reading racetrack intervention, he averaged 27.5 corrects and just .5 errors (range from 28 to 26 corrects and 2 to 0 errors.) He was able to read all 14 words correctly from the list during reversal. On List 4, participant 1 had 5 corrects and 9 errors for baseline. During the intervention, he averaged 24 corrects and 4 errors (range from 26 to 22 corrects and 2 to 6 errors). He was able to read 13 of the 14 words from the list during reversal. On the review racetrack, the participant averaged 27 corrects and 1 error (range from 28 to 26 and 2 to 0 errors)

Participant 2.

The number of words read correctly or as errors during baseline, the reading racetrack intervention and reversals are displayed in Figure 5. During baseline for List 1, the participant read 7 words correctly and made 7 errors. Throughout the reading racetrack intervention, he averaged 28 corrects with 0 errors. He read all 14 words correctly during reversal, making 0 errors. For List 2, this participant had 7 corrects and 7 errors during baseline. During the reading racetrack intervention, he averaged 27.5 corrects and .5 errors (range from 26 to 28 corrects and 0 to 2 errors.) He read all 14 words correctly with no errors during reversal. On List 3, this participant had 10 corrects and 4 errors during baseline. Throughout the reading racetrack intervention, he averaged 28 corrects and 0 errors. The participant read all 14 words correctly with no errors during reversal. On List 4, this participant had 7 corrects and 7 errors during baseline. During the intervention, he averaged 28 corrects and 0 errors. He then was able to read all 14 words correctly with no errors during reversal. Finally, during the review reading racetrack phase, the participant averaged 28 corrects and 0 errors.

Discussion

Our results demonstrate reading racetracks paired with flashcards were an effective way of teaching sight words to both participants. Word recognition skills were maintained during the review reading racetrack sessions.

Anecdotally, the first participant would get frustrated when presented with novel things, such as new words. Thus when a new list was presented to him, the first session was often difficult for him to finish. He was most frustrated when reading racetrack 4 was presented. During baseline, he was only able to correctly read 5 of the 7 of his known words. During that racetrack, he typically passed on the words he did not know. Fortunately, he did not engage in any inappropriate behaviors during the investigation. He asked to work for Blow Pops, and they remained a strong motivator during reading racetracks.

The second participant was positive about the project and this lasted throughout data collection. He was apparently reinforced working one-on-one with adults; thus, it appeared that adult interaction was the only consequence he needed to participate in the project. He would let the first author know when he would like to do the racetracks that day. Often he would tell the teacher a sentence with the word in it, without any prompting. This demonstrated he not only was able to read the word, but also knew the meaning of the word.

This study was practical, inexpensive, time-efficient, and easy to implement and create. The intervention was easily employed in the classroom setting, and did not take much instructional time out of the day. The classroom teacher was able to replicate it easily, and continued its use after formal data collection ceased. The improvement of student sight-word vocabulary has been linked to improving long-term outcomes for students with and without disabilities (Howard et al., 1996; Farkas & Beron, 2004; Slavin, 1996).

There were limitations in the present research. First, the pre-assessment of the words the participants knew could have taken place for longer than just one session. In future research, the pre-assessment should be carried out at least two or three times. This should allow the teacher to determine if there were any inconsistencies or patterns between known and unknown words. This may have prevented problems such as List 4 for the first participant. In baseline he was only able to read 5 words that were on the known list, and would not have had 9 unknown words. Another way to address our assessment problem would have been to employ some type of criteria, such as corrects and errors per minute, to establish the instructional level for our participants. We only included two participants because that was the number of students recommended by the classroom teacher. Adding an additional participant would have added additional validity to our outcomes (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005). The lack of standardization reviewing the flashcards either two or three times should also be changed. Review the flashcards two or three times and on a consistent basis. Another limitation was that not enough data were collected during experimental condition. Only one data point was plotted for each baseline condition. With only one data point, determining trend, level of performance, and stability was not possible. Similarly, only one measure of performance was taken during reversal condition. The use of a reward system in conjunction with the reading racetrack intervention produces an additional confounding variable in the present study. As part of our ongoing documentation of candidate performance in changing student outcomes (McLaughlin, Williams, Williams, Derby, Weber, & Bjordahl, 1999), we require that our students carry out a preference assessment in the student teaching experience. The participants earned their preferred reward for each session during the reading racetrack phases. Unfortunately, we could not provide any evidence that the reading intervention would have been effective without the use of our reward system.

The present research adds to the growing literature on the positive outcomes when racetrack procedures are employed (McLaughlin, Weber, Derby, Hyde, Violette, Barton, et al., 2009). The

present outcomes replicate our previous research (Anthony et al., 1997; Falk et al., 2003; Printz et al., 2006; Rinaldi & McLaughlin, 1996; Rinaldi et al., 1997). Also, we were able to demonstrate that reading racetracks could be effective with a student with mild intellectual disabilities. Racetrack procedures could be employed with other subject matter areas such as math (Beveridge, Weber, Derby, & McLaughlin, 2005). Additional research in such subject-matter areas such as spelling, social studies, and science appears warranted.

This study demonstrates that reading racetracks paired with flashcards and a reward system was an effective way to teaching sight words to two participants with moderate disabilities in a self-contained classroom. To better evaluate the effects of reading racetracks, data could be gathered from various settings and with students with various disabilities. Finally, one could compare the effects of reading racetracks with and without employing a reward system. One could employ an alternating treatments design (Barlow et al., 2008) to add and remove such a system across racetracks as a way to assess its contributions of classroom reward procedures.

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Author(s) Note

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Dolch Pre-Primer (40 Words)

a	here	play
and	I	red
away	in	run
big	is	said
blue	it	see
can	jump	the
come	little	three
down	look	to
find	make	two
for	me	up
funny	my	we
go	not	where
help	one	

Figure 1. Dolch Pre-Primer Word List

Dolch Primer (52 words)

all	into	that
am	like	there
are	must	they
at	new	this
ate	no	too
be	now	under
black	on	want
brown	our	was
but	out	well
came	please	went
did	pretty	what
do	ran	white
eat	ride	who
four	saw	will
get	say	with
good	she	yes
have	so	
he	soon	

Figure 2. Dolch Primer Word List

Fourth Grade Core Words

able	complete	heard	order	stop
a	course	himself	perhaps	strong
against	cut	hold	person	sun
ago	didn't	horse	piece	sure
am	dog	hot	plants	surface
American	done	hundred	play	table
among	door	idea	point	talk
answer	draw	inside	probably	ten
anything	early	it's	ran	that's
area	eat	I'll	ready	thing
became	English	I'm	really	though
become	example	kept	red	told
before	face	knew	remember	top
behind	family	later	rest	toward
back	fast	learn	river	town
body	feel	learned	room	tree
book	felt	less	run	true
box	fine	letter	sad	try
brought	fire	list	sea	turn
built	fish	lived	seen	turned
cannot	five	living	several	United States
can't	front	matter	short	upon
car	full	mean	shown	usually
certain	gave	money	six	voice
change	green	morning	space	whether
city	ground	move	special	whole
class	group	nothing	stand	wind
close	grow	notice	start	yes
cold	half	oh	state	yet
common	hear	open	stood	young

Figure 3. The 4th Grade Core Word List

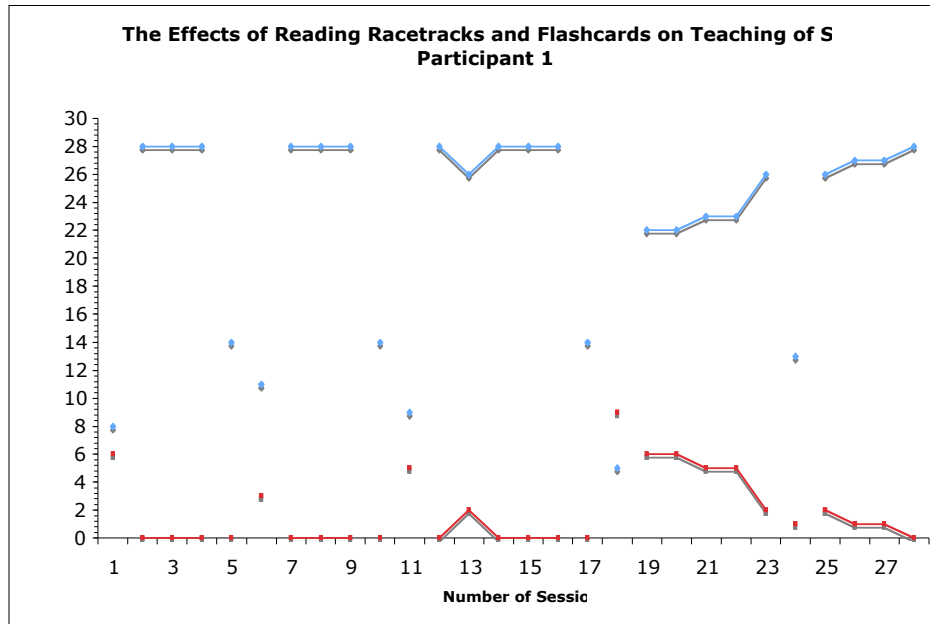


Figure 4. The number of corrects and errors for Participant 1 during baseline, reading racetracks, reversal, reading racetracks, and maintenance.

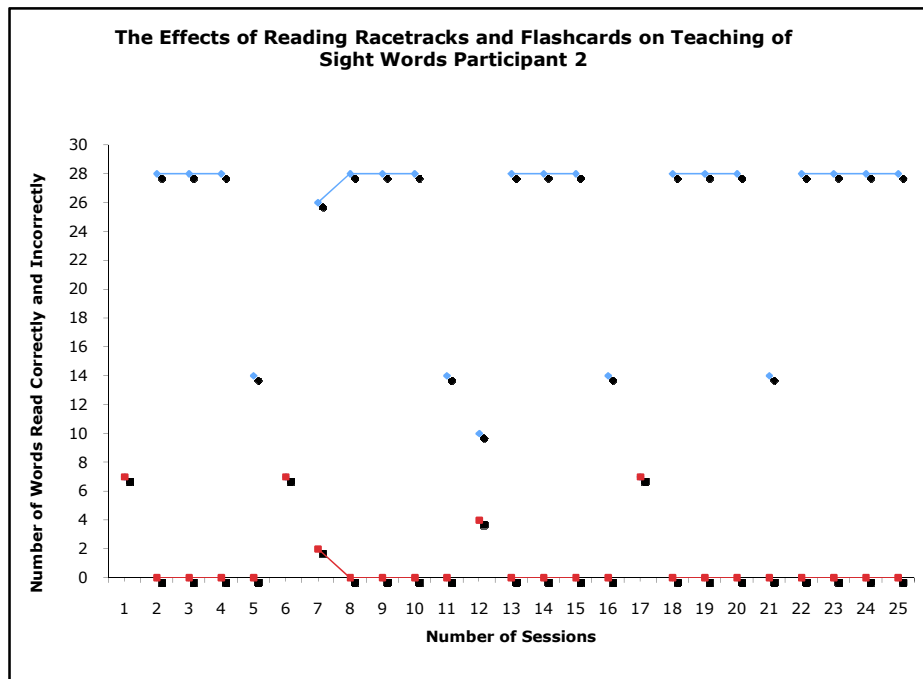


Figure 5. The number of corrects and errors for Participant 2 during baseline, reading racetracks, reversal, reading racetracks, and maintenance