Combining Repeated Readings and Error Correction to Improve Reading Fluency

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A repeated readings procedure was used simultaneously with an error correction package that included modeling, prompting, paired reading, neurological impress, and chaining procedures to increase reading fluency in a student attending a university sponsored summer school clinic. An A-B experimental design (Cooper, Heron, & Heward, 1987; Kazdin, 1982) was used to evaluate the frequency of correct and incorrect read words across one-minute timing periods. During baseline, the student read fewer than 60 correct words per minute. A jump-up occurred in both corrects (X 1.5) and incorrects (X 8.0) upon introduction of the repeated readings procedure. Reading performance improved with corrects accelerating and incorrects decelerating, with a bounce of 0-3, across the final six days of repeated readings and error correction instruction. The minimum fluency criterion of 180 correctly read words per minute was met in seven sessions. The data shows a substantial and sustained improvement in reading fluency with the introduction of the repeated readings and error correction package.

Reading is perhaps the most important, yet difficult skill to acquire. One can conceptualize the global skill of reading as consisting of three basic skill domains: decoding, fluency, and comprehension. While each domain may be, and often is, taught separately, they are clearly interrelated. The ability to decode words and read fluently are prerequisite to understanding the information in a text (McCormick, 1995). Without fluent reading skills, the acquisition of a general knowledge base, including civics, history, and science, to name a few, is likely to be hindered. In a broader sense, poor reading skills are likely to hinder the acquisition of cultural literacy, which is critical to effectively communicate with others given many references in daily conversation assume a common knowledge base (Hirsch, 1988). Therefore, instruction designed to produce fluent reading skills is essential for students to be able to participate, contribute, and function in a literate society. A literate society is one whereby its citizens share a common knowledge base. Shared background knowledge enables individuals within a society to pick up a newspaper and read with an adequate amount of information so as to "get the point". To understand the meaning of the text then, the reader must possess a sufficient amount of background knowledge with respect to the topic (Malanga, 1997). Said another way, to understand the text, we must understand the context, and that is what background knowledge provides. Cultural literacy refers to this shared knowledge base (Hirsch, 1988). There is a substantial research base supporting the relationship between the acquisition of background knowledge and comprehension of prose (Erwin, 1992; Malanga, 1997; Pearson & Fielding, 1991; Pearson, Hansen, and Gordon, 1979; Stevens, 1982).
The broader the array of background knowledge a reader possesses the more intellectual capital.

A well-informed citizenry requires the accumulation of what Hirsch (1996) calls "intellectual capital". Intellectual capital refers to a common core of background knowledge required to effectively communicate in a democratic society (Hirsch, 1996). Intellectual capital can be understood in the same vein as money capital. In education circles, it is a commonly accepted assumption that the more information a person possesses, the more readily new information is assimilated and understood. The accumulation of new information results in an increase in intellectual capital, which fosters the accumulation of additional new information. Simply stated, background information is intellectual capital. Very little intellectual capital can be acquired, however, without a firm foundation in basic reading skills. The presence of a firm foundation of basic reading skills is what defines a competent reader. However, the question remains, what skills does a competent reader possess? Competent readers can, at minimum, describe information read in a text. Said another way, they can comprehend what they read, which is the main point of reading. The development of fluent reading and comprehension of text, however, is contingent on the firm development and generalized application of decoding skills (McCormick, 1995). The composite ability to comprehend text, then, is contingent on the development of component skills such as phonological awareness, alphabetic understanding, and automaticity with the code (Kameenui, Simmons, Baker, Chard, Dickson, Gunn, Smith, Sprick, & Lin, 1998).

Phonological awareness refers to the ability to hear and manipulate sounds. This includes the ability to segment words into sounds, blend individual sounds to form a word, manipulate sounds within words, and perceive words as sequences of sounds (Kameenui, et al., 1998). These skills, combined, form the foundation for the development of alphabetic understanding.

Alphabetic understanding refers to the knowledge that words consist of letters and the grapheme-phoneme relationship (McCormick, 1995; Kameenui, et al., 1998). Alphabetic understanding is prerequisite to the development of effective decoding skills. This said, it follows that firmly established decoding skills are required for the acquisition and generalization of word recognition skills. Once a word recognition repertoire is established, one can develop automaticity, or fluency, with the code. Competent readers demonstrate automaticity with the letter-sound code. Further, readers who can automatically decode unfamiliar words are likely to develop fluent reading skills, skills that require no conscious attention (LaBerge & Samuels, 1974). Fluent reading then, is reading that occurs quickly and without hesitation with few errors. Higher levels of comprehension of connected text have been correlated in readers who exhibit these characteristics (Anderson, 1981; Fowler, 1993; Howell & Lorson-Howell, 1990). Moreover, higher levels of literal comprehension of textual information has been shown to be functionally related to higher levels of oral reading fluency (Sweeney, 1992). Conversely, slow
readers perform poorly in comprehension tasks due, in part, to frequent repetitions and hesitations which breaks up the continuity of thought (Downs & Morin, 1990). Succinctly stated, skill at comprehending important information from prose is a skill that distinguishes good from poor readers (Baumann, 1984). This said, it follows that it would be desirable to identify and refine an instructional method that results in efficiently producing fluent reading performance. One empirically validated instructional strategy that has been found to increase reading fluency is repeated readings (Sweeney, Omness, Janusz, & Cooper, 1992; Polk & Miller, 1994).

Fluency is defined as accuracy plus rate of response and is correlated with increased skill retention and transfer to untrained settings (Binder, 1993; Carroll, McCormick, & Cooper, 1991). Fluent reading performance is also correlated with increased comprehension ability (Polk & Miller, 1994). Simply stated, students with fluent reading skills can recall what they read, which is the main point of reading (McCormick, 1995). A repeated readings procedure allows a reader to reread the same passage until a minimum fluency aim is achieved (Sweeney, 1992). The immediate feedback students receive after the end of a reading episode often results in improved performance levels due, in part, to the specificity and immediacy of the feedback. In effect, specific and immediate feedback allows the student to set personal goals on a minute-by-minute basis, thereby increasing a student's level of achievement (Shirley & Pennypacker, 1994). Repeated readings have been empirically validated as an efficient method for substantially increasing reading performance (Polk & Miller, 1994; Daly & Guildswog, 1992; Bolich & Sweeney, 1996; Brosovich-McGurr, 1991; Carroll, et al., 1991; Stroeh & Sweeney, 1999). Polk and Miller (1994) assessed the effects of flashcards and repeated readings on reading performance with secondary students with emotional disabilities. Flashcards were used to remediate errors each student made on the previous day. Immediately after reviewing correct pronunciation of incorrectly read words, the students were provided two opportunities to orally read the same passage. All students evidenced an acceleration in words read correctly and a deceleration in the number of incorrectly read words compared to baseline performance. Carroll, McCormick, and Cooper (1991) used a modified repeated readings procedure to increase the reading performance of four elementary students with severe reading disabilities. Repeated readings were conducted with the same passage twice per session until a performance criterion of 100 correct and 3 or fewer incorrect responses was achieved. Error correction was provided for each word missed immediately after the first one-minute timing by requiring students to correctly see/say the missed words when presented on flashcards. A second one-minute timing was then provided. All students demonstrated rapid increases in the number of correctly read words and decreases in the number of incorrectly read words when the repeated readings and error correction procedures were introduced.

Besides working with students with emotional and behavioral problems, repeated readings have shown beneficial
for a variety of students, in a variety of settings, and across numerous curriculum and academic areas. For example, repeated readings procedures were successfully employed for improving the oral reading fluency of a 43-year-old adult with severe reading and oral language deficits (Sweeney et al., 1992). Lee (1990) combined peer tutoring with repeated readings to improve the reading performance of third graders experiencing reading difficulties. Brosovich-McGurr (1991) implemented repeated readings procedures to improve oral reading successfully with secondary students with learning disabilities. Additionally, the effects of both oral reading fluency and literal comprehension (i.e., retelling comprehension) were shown with academically at-risk fourth- and fifth-grade regular education students (Sweeney, 1992). Repeated readings have also been successfully used to assist in the acquisition of second languages. For instance, Bolich and Sweeney (1996) utilized repeated readings combined with SAFMEDS and a See/Write-Think/Write practice procedure to develop fluent oral reading in Hebrew with an 11-year old girl. Stroeh and Sweeney (1999) also used repeated readings and SAFMEDS with an eighth-grade male to improve his functional performance at reading and speaking Spanish as a second language.

The aforementioned studies demonstrate the robust nature of repeated readings and repeated practice procedures for improving an individual's performance in oral reading fluency, comprehension, and acquisition and fluency of second languages. While the reviewed studies demonstrated measurably superior performance gains with the use of repeated readings procedures and an instructional package across a variety of settings and student characteristics, one cannot infer the external validity of one instructional package across students with different learning characteristics or alternative instructional methodologies. None of the repeated reading studies reviewed incorporated an error correction package that included modeling, prompting, paired reading, neurological impress, and chaining procedures to remediate reading difficulties. The current investigation assessed the effects such a treatment package in conjunction with repeated readings. The purpose of the current study, then, was to determine the effect of repeated readings and an error correction package on the number of correct and incorrect words read per minute.

METHOD

Participant

Michael was a 10-year-old boy who was assessed and placed in a special education resource room by his local school for specific academic problems in reading and written expression. Michael received special education services for two years at his local school prior to attending the summer school program. Michael's special education teacher referred him to the summer school program as an extended school year placement option, for additional remedial reading and written language instruction. The summer school program, based at the local university, serves students with a variety of academic, social, and behavioral difficulties.
The summer school program ran four days a week, Monday through Thursday, for four weeks during the month of July.

Setting
Thirty-five students, kindergarten through grade 9, attended the summer school clinic. Five teachers and two paraprofessionals worked with small groups of students in this setting. The five teachers were all special education teachers completing a summer internship that served as the culminating instructional experience in their masters programs. The two paraprofessionals were both undergraduate special education majors completing requisite practica experiences prior to their respective student teaching experiences in regular and special education. Each teacher worked with approximately 5 to 7 students who were grouped based on their developmental levels, (e.g., kindergartners and first graders, second and third graders, fourth and fifth graders, sixth and seventh graders, and eighth and ninth graders). The primary modes of instruction employed in summer school program were small group and one-on-one instruction. A small conference room, adjacent to the main classroom was used for individual, one-on-one instruction. Michael and the first author met daily in the small conference room for individual reading instruction and assessment. No other teachers or students were present during instruction. Each instructional session lasted approximately fifteen minutes.

Materials
A passage from the book, *Little House and the Big Woods* (Wilder, 1976), was used for repeated readings. The passage contained 265 words and was selected based upon Michael's initial reading performance of 57 correctly read words per minute with only one error.

Performance
The movement cycle targeted for Michael to improve was oral reading fluency. The learning channel used for practice and assessment for oral reading was See/Say. The correct/incorrect pair used to evaluate repeated readings was the number of words read correctly or incorrectly during a one minute counting period. Incorrects were defined as repetitions, substitutions, omissions, and insertions. One-minute timings were used as the timing period throughout the evaluation periods. The instructional aim for the student was 180 to 210 correctly read words.

Procedure
After reading the passage through once with the instructor to correct any initial reading problems, Michael was told that it was time for his repeated readings. To complete the repeated readings procedure, the instructor told Michael to read as much of the passage as possible in a minute. The instructor explained the importance of both speed and accuracy and that she would be counting the number of words read correctly and incorrectly within the one-minute timing period. The student was told to skip words he could not pronounce. The text chosen was determined to be challenging based on Michael's baseline performance. Each day following the initial baseline, the student chose a goal of number of words read per minute that he wanted to reach. Michael was allowed four one-minute timings during a session to increase his reading fluency. The instructor began timing after Michael
started the first word of the passage. As Michael read, the instructor marked errors on a duplicate copy of the reading passage. The instructor marked a "/" to indicate the beginning and ending point related to the total number of words read. The student and instructor counted the number of correct and incorrect words read immediately after each repeated reading. The student and instructor charted Michael's best daily score of the repeated readings immediately after completing the assessment procedure.

Error Correction
The instructor used modeling, prompting, paired reading, neurological impress method, and chaining procedures to remediate reading difficulties as determined by an error analysis of each reading event. Modeling consisted of the instructor correctly pronouncing the word and requiring Michael to reread that word properly. Prompting consisted of providing a phonetic prompt to assist Michael in decoding difficult to read words. Paired reading consisted of the instructor reading a sentence or two from a passage followed by Michael reading the next few sentences in the passage. Paired reading was repeated until Michael read without hesitation one time. The neurological impress method consisted of the instructor and Michael simultaneously reading the passage, thereby allowing Michael to hear how a fluent reading performance sounded. Chaining required Michael to read a section of words quickly. For example, Michael was asked to reread, "Jack and Jill went up the hill" until he could read this phrase without hesitation or pauses for decoding. Subsequent to that performance, an additional section of words was added to the previous section of words. For instance, "to fetch a pail of water" was then practiced and later chained with the original phrase to form a complete sentence (i.e., Jack and Jill went up the hill to fetch a pail of water). The student was allowed to ask questions or ask for help if needed during the instructional time.

RESULTS
The data indicate improvement in oral reading performance with the use of repeated readings. During baseline, the number of words read correctly was 57, with one incorrect. Upon the introduction of the repeated readings procedure, there was a concurrent jump-up in the number of correct and incorrect words read. Michael's number of correct words jumped-up approximately X 1.5, while the number of incorrect words jumped-up X 8.0 on the first day of repeated readings. The number of correctly read words improved on each successive instructional day. Results show an accelerating trend for correctly read words and a decelerating trend for incorrectly read words. The slope of the acceleration for the number of correctly read words was X 1.75, while the slope of the deceleration for incorrectly read words was + 2.1 during the repeated readings condition. During the repeated readings condition, the median number of correctly read words was 149 with scores ranging from 88 to 228. The median number of incorrectly read words was 4 with scores ranging from 0 to 8. The overall frequency change for the accelerating number of correctly read words was 140 and the overall frequency change for the decelerating learning
opportunities was 8 during the repeated readings condition. Michael's overall performance change during the repeated readings procedure was $X = 2.7$ for correctly read words, while his overall performance change from baseline to his highest repeated reading timing was $X = 4.0$. Michael's overall performance change during repeated readings for incorrectly read words was $X = 8.0$.

**Maintenance**

A natural maintenance check occurred as the result of the clinic's schedule. Each week, three successive days passed between the last instructional day of one week and the first instructional day of the following week. Each Monday's performance was higher than the Thursday performance of the previous week. This suggests a certain amount of "robustness" in the instructional package employed.

**DISCUSSION**

Improvements were demonstrated in oral reading fluency when using repeated readings. The number of correctly read words increased each day while incorrects decreased. Michael achieved the minimum fluency aim of 180 correctly read words within seven repeated reading sessions and improved for two consecutive days to reach a high of 228 correctly read words with 0-1 incorrects. Michael was excited about meeting his daily goal and showed more interest in wanting to read for the instructor during the repeated readings procedure. Even after being away from the classroom setting, Friday through Monday, the student displayed an increase in number of correctly read words. The results of this demonstration project are consistent with the established repeated readings research base. It is interesting to note that the overall acceleration value for Michael during intervention is steeper than was evidenced in the Carroll, et al. (1991) study. This is also the case for three participants on their initial passage in the Polk and Miller (1994) study. A number of factors may account for this difference. First, in each of the above-cited studies, two one-minute timings were conducted. Four were conducted in the current study. The sheer number of practice opportunities could account for the steeper slopes. Second, the error correction procedure in the current demonstration project incorporated five methods: paired reading, chaining, modeling, neurological impress method, and prompting. It is reasonable to assume the cumulative effect of these five instructional procedures resulted in faster acquisition rates compared with error correction procedures incorporating fewer methods. Future research might focus on conducting a component analysis of the error correction procedures used in this study. A component analysis would help determine the relative efficacy of each procedure when combined with repeated readings. Such an analysis may reveal that one or more methods was of negligible effectiveness, thereby allowing a more efficient error correction instructional method to be developed. Limiting the number of one-minute timings to two would also provide an equitable comparison with the existing research base. If, for example, comparable frequency jumps and acceleration values were demonstrated with fewer timings, this would lend evidence to the overall efficacy of the instructional
package and reduce the total amount of time required to reach predetermined fluency aims.

Finally, given the inherent limitations of the case study design (Cooper, et al. 1987; Kazdin, 1982), one cannot rule out the possibility of confounding variables. However, given the significant jump-up/turn-up values, this would seem unlikely. A multiple baseline design across students would lend itself well to establishing experimental control and demonstrating prediction, verification, and replication of treatment effects (Cooper, et al. 1987).

REFERENCES


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