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Assessing TAGteach Methodology to Improve Oral Reading Fluency in English Learners

A Thesis
by
Luz G. Cabrera

Submitted to the Faculty of the Department of Health Professions
at Rollins College in Partial Fulfillment
of the Requirements for the Degree of

MASTER OF ARTS IN APPLIED BEHAVIOR ANALYSIS AND CLINICAL SCIENCE

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Abstract

The purpose of the study was to evaluate the effects of TAGteach™ methodology to improve oral reading fluency in three participants whose second language is English. TAGteach is a form of clicker-based training that uses behavioral principles (TAGteach, 2016). Individualized TAGteach-based interventions were provided to three participants, all of whom spoke Spanish as their dominant language in the home. All three participants attended an after-school tutoring program. Sessions were held at a local community center for migrants originating from Central and South America. Initial benchmark testing assessed the participants' reading level and oral-fluency level using the Bader Reading and Language and Inventory (BRLI; Bader & Pearce, 2013). Individualized TAGteach interventions were developed for each participant based on their initial benchmark test scores to improve specific errors in reading fluency. Based on partial data, results suggest the TAGteach intervention effectively reduced the type and quantity of reading errors for one participant before the study was halted due to closure of the community center.

Keywords: applied behavior analysis, reading, TAGteach, oral reading fluency, English language learners, acoustical feedback

Introduction

The U.S. population continues to grow and become a new home for many families who hope to flourish and explore new possibilities (U.S. Census Bureau, 2011). According to the United States Census Bureau (2011), the Hispanic population is predicted to continue to increase, in the future. Along with the increase in migrants, there is an increase in new students entering the school systems. Specifically, in Florida, the Orange County Public Schools' (OCPS) "report cards" for the 2017-2018 school year indicated Hispanic students made up 41% of the students served by the school district (OCPS English Language Learners Report, 2018). This is a 2.3% increase from the year prior, likely due to factors such as families moving to a new county within the state to pursue job opportunities and the displacement of many families in Puerto Rico following Hurricane Maria in May of 2017 (Gargotta, 2018). As of 2018, the total number of students considered to be English Language Learners (ELL) was 33,081, accounting for 15.9% of the district's student population (OCPS, 2018).

According to the Florida Department of Education, an English language learner (ELL) student must meet specific criterion. These specific requirements include: being a student not born in the U.S. and whose native language is one other than English, being an American Indian or Alaskan Native whose English has been impacted by another language, or being a student who was born in the U.S. but comes from a home where a language other than English is the primary form of communication. If a student can meet one of the three criteria, they must also have sufficient difficulty reading, writing, speaking, or understanding English, making the learning opportunities in the classroom a difficult task (FDOE, n.d.). Given the increasing number of students in the school system who are identified as ELLs, it is imperative that teachers are equipped to address the needs of this population to ensure academic success and inclusion.

Moreover, research has highlighted the influence of variables that can affect a student's success in the school system (Reardon & Robinson, 2007). One of the most frequently used indicators of student risk of low academic performance is socio-economic status. As such, there is a large gap in academic performance observed between high- and low-poverty students (Reardon & Robinson, 2007). For the Hispanic and Asian populations, socioeconomic differences predict a large portion of the variability in academic disparities in young children, but the disparity narrows as children acquire the language spoken at school and progress through each grade level (Reardon & Robinson, 2007).

As behavior analysts, we should continue to not only develop a cultural awareness of our clients (Fong, Catagnus, Brodhead, Quigley, & Field, 2016) but also strive to continue refining research to best help families of different cultural backgrounds achieve mastery of the skills needed to be successful in life. An innovative intervention that might potentially be useful for students is the application of Teaching Acoustical Guidance (TAGteach) technology (TAGteach International, 2016). TAGteach uses an acoustic stimulus, usually in the form of a clicker, to provide immediate feedback following the occurrence of a specified behavior. The clicker becomes a conditioned reinforcer after being paired with a reinforcer such as edible items, verbal praise, or access to a preferred tangible item. TAGteach has been applied to the field of sports, dancing, and special education instruction for children with autism (Quinn, Miltenberger, & Fogel, 2015). Developing a reading intervention with TAGteach to address oral reading fluency would provide students with an intervention that will help them master a new language.

Review of Literature

As behavior analysts, developing and evaluating technology to best assist students and educators is of important social significance (Baer, Wolf, and Risley, 1968). Reading is a

foundational skill that, as Stage and Jacobsen (2001) found, is a strong indicator of academic achievement and predictor of student success on state-mandated reading assessments.

Oral Reading Fluency

To acquire and master a new language requires the learner to fluently read, write, and speak the language. Specifically, according to the National Reading Panels (NRP) Report (2000), oral reading fluency, defined as the automaticity and accuracy with which a student is capable of reading words, is a strong indicator of reading proficiency and is a core component of early reading. Kuhn and Stahl (2003) highlighted the primary components of fluency, including the use of appropriate features of prosody, such as pitch and stress. By achieving fluency, students can focus on the text's meaning instead of decoding the individual words in the text. As such, fluency is referred to as the "bridge" between word recognition and text comprehension (Ford, 2015).

The process of assessing reading fluency involves three components: prosody, automaticity, and reading accuracy (NRP, 2000). Prosody refers to the attention given to punctuation signs like periods and commas, which assign the appropriate stress to individual words, and is often evaluated through the use of rubrics that score the pitch, intonation, phrasing, and expression of a given text. Automaticity refers to the speed through which words are read and is typically measured through reading rate. Accuracy refers to the percentage of words the student can read correctly (Ford, 2015).

Furthermore, there are two distinctions with regards to fluency: silent reading fluency and oral reading fluency (Kim, Wagner, & Lopez, 2012). One way in which educators can help students' acquisition of a language is through improving oral reading fluency, as it is considered a strong indicator of reading proficiency and is a core component of early reading (NRP, 2000).

Silent reading fluency is the most common type of fluency and is defined as reading silently while progressing through the text (Kim et al., 2012). Proficiency in silent reading is strongly correlated with reading comprehension and thus facilitates language acquisition. According to Kim et al, children first work on oral reading fluency by reading text out loud and working on proper pronunciation and understanding meaning. Once the oral reading fluency is sufficiently established, the child is expected to transition into silent reading (Kim et al., 2012). Oral reading fluency is a foundational skill that must be mastered by students to establish reading proficiency and reading comprehension. Establishing this foundational skill would help in narrowing the academic disparities for new students.

Current Interventions

The NRP (2000) examined the instructional literature related to fluency with two methods: guided oral reading and independent silent reading interventions. The authors of the NRP defined independent silent reading as providing time for children to read by themselves, and guided oral reading as approaches that involve having the student read with guidance and feedback. The analysis of silent reading interventions yields limited data on the effectiveness in improving reading achievement. There was more evidence that guided oral reading provided a more consistent and positive impact on fluency, word recognition, and text comprehension (NRP, 2000). An extensive review conducted by the NRP (2000) highlighted the best classroom practices as the ones that utilize guided oral reading with feedback and guidance to improve the performance among students who are considered good readers and provide extra support to those who are experiencing difficulties.

A further distinction lies in reading interventions considered assisted and unassisted, which denotes the level of teacher or peer involvement. According to Kuhn and Stahl (2003),

one of the best-known unassisted reading interventions designed to support fluency is repeated reading. Using this strategy in the classroom setting, the students read and repeatedly reread a new text daily to improve their word-recognition skills and increase their fluency with the text.

Another intervention includes modeling reading and word pronunciation by instructors.

Modeling interventions, however, lack continuous feedback for students and provides minimal support and reinforcement for students to differentiate their successes and challenges (Cheung & Slavin, 2012).

Alternatively, assisted reading interventions provide learners with a model of fluent reading and can vary from reading while listening (e.g., watching closed-caption television) to choral reading (i.e., reading aloud in a group; Kuhn & Stahl, 2003). These assisted-reading programs can be categorized as involving two different forms of instruction, antecedent or consequence interventions. Antecedent-focused interventions provide instructions in the form of modeling and practice, whereas the reading interventions focused on consequences provide reinforcement contingent on fluent and accurate reading (Eckert, Ardoin, Daly, & Martens, 2002). The National Reading Report discusses the need for more research to study the impact of programs that encourage reading on different populations of students at varying ages and reading levels (NRP, 2000).

TAGteach

While TAGteach has not been utilized in published research to improve oral reading fluency, TAGteach might provide a comprehensive and efficient approach. Essential characteristics of TAGteach include the focus on clear and consistent feedback and instructions, which could effectively assist students in refining and mastering a second language. Resources on the TAGteach International website (www.tagteach.com) refer to a vast expanse of

presentations, unpublished and published research, and multiple anecdotal reports of the methodology's effectiveness in a variety of areas, such as tying shoelaces and word pronunciation. Thus, TAGteach may be uniquely equipped to adapt to the needs of students learning a second language.

The TAGteach methodology utilizes several behavioral principles and evidence-based procedures, including modeling, shaping, and task analysis (Fogel, Weil, & Burris, 2010). The sound of the clicker (the audible stimulus) is used to mark, or tag, a correct instance of the target behavior immediately after it occurs, providing immediate feedback to the learner. The clicker can also be modified to any other auditory or visual markers. Another defining characteristic of TAGteach is the use of tag points developed through the use of "WOOF," which consists of the following four criteria: (a) What you want; (b) One thing; (c) Observable; and (d) Five words or less. Thus, the tag point is the behavior that is acoustically marked as it occurs.

TAGteach also used the "break it down" aspect, in which the tasks are divided into segments that are easily identified, achieved, and reinforced akin to a task analysis. The three-try-rule is another feature used to determine when to modify tag points should the learner fail to correctly complete three tag points in a row. As a result, the individual implementing TAGteach returns to the "point of success" wherein the student last performed the correct tag point and further breaks down the incorrectly performed tag point to smaller components to facilitate acquisition of the tag point.

TAGteach has been studied in a variety of areas with participants at varying levels of ability, age, and skills being taught, highlighting the adaptability to a vast array of populations and skills of interest. For example, TAGteach has been used to teach highly skilled surgeons to refine surgery skills. Levy, Pryor, and McKeon (2016) compared an adapted form of TAGteach

to a demonstration of a skill alone to teach a surgical skill taught from a list from a surgical skills program to medical students and residents in a group design. The participants were taught the skills “tying the locking, sliding knot” and “making a low-angle drill hole” using two methods. The control group was taught these skills using traditional demonstration methods typically used in training and the test group was taught using the adapted TAGteach methodology. Results demonstrated that participants who were taught surgical skills using the TAGteach method acquired the skills faster and with greater accuracy on both the drill (mean 90% vs 11%) and knot skill (mean 100% vs 36%). However, caution should be taken in assessing the data as there were no reports or mention of inter-observer agreement (IOA) to corroborate the data recorded by the single experienced surgeon.

TAGteach has also been used to teach intermediate-level skills in football and rugby. Harrison and Pyles (2013) assessed TAGteach paired with verbal instruction and verbal instruction alone to improve tackling and ensure safety and effectiveness with three high school football players. Results showed a significant improvement with all three participants that combined TAGteach and drills with a ball carrier in comparison to only using drills with a dummy. Stokes, Luiselli, Reed, and Fleming (2010) used TAGteach, verbal feedback, and verbal feedback with video feedback to improve the offensive line pass-blocking skills of five high school football players. All of the participants met the acceptable performance criterion and four of the five participants received TAGteach as an intervention. Generalization was not maintained for three participants for whom maintenance data were collected. Data concerning social validity indicated the TAGteach intervention rated higher than standard coaching and verbal feedback, however, it scored lower than verbal feedback with video feedback. Further research on intermediate athletic skills was conducted by Elmore, Healy, Lydon, and Murray

(2018), who examined the effects of TAGteach on the passing skills of three experienced college rugby players. It is the first study assessing TAGteach for skills training among high-performance athletes. The authors implemented a stringent performance criterion of task analysis steps to be completed correctly and each step within the analysis was “tagged” during the intervention. The TAGteach intervention improved the performance of the rugby players in each of the targeted passing skills by an average of 11.7% when compared to baseline performance.

TAGteach has also been demonstrated to improve the performance of participants who were learning novel skills. Fogel, Weil, and Burriss (2010) utilized TAGteach methodology to teach a complex golf skill to a novice learner. A task analysis detailing the components that make up the golf swing was used. The learner was informed that a click meant the skill was performed correctly and the absence of a click meant to reassess and attempt the skill again. The skills were marked until the criteria were met. Results demonstrated that the participant acquired four of the five skills taught, and the skill generalized to another golf club without training. The authors concluded that TAGteach was an effective methodology and social validity was high with an average rating of 5.4 out of six. Additionally, Quinn, Miltenberger, and Fogel (2015) evaluated the effectiveness of TAGteach for improving the performance of four children enrolled in a dance class. The study assessed TAGteach implementation by the dance teachers to teach three dance skills of turning, kicking, and leaping. Along with the task analysis, the teachers gave verbal instructions, demonstrated the movements, and had the student mark the correct movements. The intervention was implemented for all students and a token system was added from one student. The participants improved in all skills and social validity for the intervention was high with anecdotal reports that one teacher became certified in TAGteach after the study.

TAGteach has also been used with individuals of varying ages. Ennett, Zonneveld, Thompson, Vause, and Ditor (2019), evaluated the error-correction component of the TAGteach intervention package to teach beginner yoga poses to adult practitioners. The authors found the procedures were effective for all participants and social validity questionnaire results demonstrated that all four participants reported satisfaction with the interventions. Additionally, Quinn, Miltenberger, James, and Abreu (2017) evaluated TAGteach delivered by peers to improve dance movements with teenage dancers on a competition team. Results demonstrated that auditory feedback increased the instances of correct dance movements for the peers receiving and providing feedback.

TAGteach has also been applied to improving the skills of learners with varying levels of developmental and physical abilities. Wertalik and Kubina (2018) compared video modeling to TAGteach in the acquisition of living skills to three adolescents with autism. The three participants improved with the use of TAGteach compared to the control group and improved faster than the video modeling condition. It is important to note that while there was improvement, none of the three participants obtained mastery. Research by Carrion, Miltenberger, and Quinn (2018) evaluated the effectiveness of auditory feedback to improve the dance skills of three children with varying disabilities. They used auditory feedback to increase reinforcer immediacy, a key component of TAGteach, and found it was useful in improving dance performance when implemented by the dance teacher. Notably, this study is the first to implement TAGteach using an ABAB design, removing the intervention and reinstating it after a second baseline was recorded. The results demonstrated that removal of auditory feedback decreased the correct performance, suggesting that auditory feedback functioned as a conditioned

reinforcer. Additionally, the social validity questionnaire results from the students, parents, and instructors were positive.

Persicke, Jackson, and Adams (2014) evaluated the use of TAGteach with correction compared to corrections only to decrease toe-walking for a four-year-old boy with autism. The sound of the marker was paired with an edible reinforcer before and during the TAGteach training. The authors found that when the flat-footed walking was marked and the correction procedure was implemented, the rate of flat-foot walking increased. The procedure was faded out and the authors conducted two generalization probes at a novel location. The rate of flatfooted steps was similar to the rate observed during the intervention. Hodges, Betz, Wilder, and Antia (2019), replicated and extended these findings by evaluating whether a contingent acoustical feedback procedure was effective in increasing appropriate steps with no other intervention. Results demonstrated that the acoustical feedback procedure effectively increased appropriate walking and reduced toe walking by the participant. LaMarca, Gevirtz, Lincoln, and Pineda (2018) used TAGteach to teach the prerequisite skills needed to participate in an electrophysiological assessment (MSI) to children with autism. The participants performed the skills with six of the seven meeting the criteria 100%. The remaining participant performed the skills but it was not sufficient to demonstrate them during the assessment. The authors supplemented TAGteach for three of the seven participants during the follow-up whereas the remaining four needed to reshape the skill. These findings suggest TAGteach may be a feasible tool for training children with autism to engage in the skills to participate in clinical interventions and research.

While there is an emerging analysis of the effectiveness of TAGteach, there is little research focused on its use to improve the reading fluency of students whose second language is

English. Given the growing population of ELL students in the United States, it is imperative to evaluate interventions to best assist these students and equip educators with effective tools to help students. Thus, the purpose of the current study is to evaluate the effectiveness of TAGteach in its application to improve the oral reading fluency of ELL students.

Method

Participants and Setting

Three participants (Pedro, Regina, and Henry) were recruited from a pool of children attending a community center dedicated to providing services to the immigrant community in the southeastern area of the United States. The center offers adult literacy classes along with tutoring sessions for children during the academic year on a seasonal basis. To participate in this study, participants had to meet the following criteria: (a) elementary school age (K-6), (b) identified as English being their second language, and (c) having no prior experience with TAGteach. The names used in the study (Pedro, Regina, and Henry) are all pseudonyms for the participants chosen by the participants during the initial meeting. Pedro, Regina, and Henry all attended third-grade classrooms at a local elementary school and spoke Spanish as their first language. Sessions took place at the community center in vacated rooms that were made available depending on programming feasibility. Sessions took place twice a week and lasted approximately 10 – 15 minutes. Each room used for the study was equipped with tables and chairs.

Materials and Training

Clickers were used as part of the TAGteach intervention. The researcher was trained in TAGteach using the TAGteach International Online Certification Course (TAGteach International, 2016). Additionally, dry-erase boards, markers, and reinforcers ranging from

small toys to puzzles were used for the participants. The reinforcers were selected from a local specialty store after an informal conversation with participant caregivers regarding the participants' preferred toys. Toys were always kept in a bag. The majority of sessions were recorded on a portable video recorder. Not all sessions were recorded due to technical difficulties with the video camera.

The Bader Reading and Language Inventory Seventh Edition (BRLI; Bader & Pearce, 2013) was used to assess the participants' literacy levels and identify the miscues (or reading errors) that were used as the tag points to use to improve oral reading fluency. The passages included in the BRLI were used for baseline and intervention sessions. The BRLI was selected due to supporting research highlighting the sensitivity to issues relevant to the adequate assessment of ELL students. Additionally, the focus on individual assessment instruments such as comprehension, fluency measurements, and vocabulary knowledge best reflect the trends in literacy development rather than to theoretical constructs found in bilingual education (Boatright, 2014). The components of the inventory used to assess the participants' initial reading level and reading errors were the English Language Learning Quick Start, Graded Word Recognition Lists, Grader Reader's Passages, and Phonics Analyses.

Experimental Design and Measurement

A multiple-baseline-across-subjects design (Krantz & McClannahan, 1993) was used to examine the outcome of the TAGteach intervention on oral reading fluency. The number of errors was graphed to determine each participant's performance during the baseline and the intervention conditions.

Operational definitions. A chart with the definitions, coding, and examples can be found in Table 1. The basis of the definitions was derived from the BRLI and was expanded to

include behavioral specifications (BRLI; Bader & Pearce, 2013). It should be noted that Error A is not part of the original set of the coded items but was included as the BRLI instructions indicated that if a student should omit several words together the omission should be counted.

Procedure

Preference Assessment. A free-operant preference assessment was used to identify items to include as reinforcers for the intervention. The items included a variety of small toys typically found in grocery stores and were initially selected following an informal conversation with the participants' caregivers. All items were provided to the participant in the bag and the participant selected one to two items per session to play with during baseline and to work for during intervention sessions.

Assessment. The BRLI was administered following the guidelines for implementation and scripts provided. The researcher implemented the ELL Quick Start to establish rapport, observe current language performance, and determine the participant's interests. Based on the results of the ELL Quick Start the initial English Learner Language Level was assessed, which ranged anywhere from beginner to advanced.

Next, the Graded Word Recognition Lists were administered to estimate the participant's reading level. The lists consisted of 10 words outlined at each grade level from primary through 8th grade, plus a list designated as high school-level words. The researcher asked each participant, according to the script provided, "Read the words, try to say them all, even if you are not sure." Words read correctly were marked with a checkmark and words read incorrectly or not attempted were marked with a minus. Following implementation, the participant's instructional level was determined, and the participant was given the choice between four passages listed under their respective reading level.

Once the participant selected a story, the researcher asked the designated open-ended question to each participant, according to the script provided by the inventory, “Please read the story aloud for me. Try to remember what you read so that you can tell me about it and answer questions about it.” The primary investigator recorded the participant’s performance and recorded errors according to Table 1. Once the participant finished reading the passage, the researcher followed up with a brief set of eight comprehension questions about the story.

Finally, the Phonics Analysis was implemented. The participant was instructed to, “Read the words as fast as you can.” The list of sounds read correctly were marked with a checkmark and words read incorrectly or not attempted were marked with a minus. No feedback was provided to the participants during the assessment.

Baseline. The same BRLI-graded passage used in the assessment was used in the baseline sessions. Sessions began with the researcher asking the participant if they wanted to do a reading activity. If they said yes, the researcher pulled the participant from their tutoring group and led them to an empty room. If the participant said no, the researcher honored the request and left the volunteer space. In the room, the participant was given access to a variety of reinforcers and asked to select one to two toys from the bag of toys. The researcher and the participant played with the toys. Following 1-3 min of play time, the researcher asked the student, “Would you read this out loud for me, please?” The participant read the passage with no feedback provided by the researcher. Once the passage was read, the researcher stated, “Thank you for reading!” The participant was then walked back to their tutoring group. The errors were coded following the session and used to determine the tag points for the TAGteach intervention.

Tag point development. The most frequent and consistent errors were selected from the distribution of the errors to be the tag points for intervention. To see the distribution of the

errors, see Figure 3 for Pedro, Figure 5 for Regina, and Figure 7 for Henry. The tag point had to meet the following criteria: (a) include what you want; (b) include one behavior (as opposed to one thing, as cited in the TAGteach procedure); (c) be observable; and (d) be five words or less e.g., if the participant's most frequent error was Omissions and Partial Omissions [Error 5], they were prompted to read each word in the sentence carefully. Explanations provided to the participants varied depending on the specific error. Across participants, between one to two tag points were developed, except for Henry who remained in baseline.

TAGteach intervention. Sessions began with the researcher asking the participant if they wanted to do a reading activity. If the participant said yes, the researcher pulled them from their tutoring group and led the participant to an empty room. If the participant said no, the researcher honored the request and left the volunteer space. Participants who said yes were given free access to reinforcers from the bag and asked to select one or two items. The researcher asked the participant to select one of the three remaining stories from the graded readers passage to read. The participant was then introduced to the intervention, which followed the TAGteach script (see Appendix A for a sample script). The intervention began with an explanation of what the participant would be practicing and an introduction to the clicker. The researcher demonstrated a correct behavior which earned a click (a tag) and demonstrated an incorrect behavior with an explanation of why it did not receive a tag. The clicker was then given to the participant, who was asked to tag the researcher when she performed a correct behavior. The researcher purposely performed a behavior incorrectly to assess if the participant correctly differentiated between behaviors that earned a tag. If the participant did not tag the researcher an explanation was given on why a tag was warranted and if the participant incorrectly tagged the researcher when she made a mistake, an explanation was given on the error and why no tag

should have been given. The researcher asked for the clicker back and asked the participant if they were ready to be tagged. Tokens in the form of check marks written on a dry-erase board were utilized to keep track of the instances of correct behavior. Participants were told that for every five tags the participant would earn time to play with the pre-selected reinforcers. Sessions ended when the participant finished reading the passage. Upon successful mastery of the tag point, in which the error was at zero for three consecutive sessions, the next tag point was introduced in the next session. The previous tag point would continue to be tracked to ascertain maintenance.

IOA and Treatment Integrity

A second independent observer scored collected data on 56% of randomly selected video recorded sessions throughout baseline and intervention. Partial agreement-within-intervals inter-observer agreement (IOA) was used for quantity and types of errors (Reed & Azulay, 2011). IOA was calculated by having the observer record the number of occurrences within each interval and calculating the agreement between both observers using the agreements per error category as the basis for calculating the IOA for the total session and multiplying by 100. Mean agreement was 73% (range of 64% to 83%) for all participants.

Treatment fidelity data was collected on 56% of randomly selected video recorded sessions and was calculated by dividing the number of steps the observer scored as correct implementation by the total number of steps and multiplying by 100. The overall score of treatment fidelity was 83%.

Results

Results of the implemented interventions were obtained for Pedro and Regina, while Henry remained in baseline through the duration of the study. Figure 1 demonstrates the overall

cumulative scores of reading errors and Figure 2 displays the specific errors that were tracked for each participant. Breaks in data indicate sessions in which participants were absent. In the initial assessment, Pedro scored at the intermediate level in the ELL Quick Start assessment, with an instructional level of 3rd grade according to the graded word recognition list. Throughout baseline (see Figure 3), Pedro's consistent reading errors were determined to be Omissions and Partial Omissions (Error 5), Hesitations (Error 10), and Ignored Punctuation (Error 12). The first intervention selected and developed for Pedro focused on Omissions and Partial Omissions (Error 5). The TAGteach lesson outlined the need to read each word out carefully to ensure he read the story in its entirety and for every sentence read correctly, he received a tag. The intervention reduced Omissions and Partial Omissions (Error 5) to near zero levels throughout the four sessions in which it was implemented (see Figure 4). Following these sessions, Pedro was not in attendance for the remainder of the study.

Regina scored at the advanced level in the ELL Quick Start assessment with an instructional level of 4th grade according to the graded word recognition list. Throughout baseline (see Figure 5), Regina's consistent reading errors were determined to be Substitutions and Mispronunciations that Disrupt Meaning (Error 1), Omissions and Partial Omissions (Error 5), and Ignored Punctuation (Error 12). The first intervention selected and developed for Regina was focused on Ignored Punctuation (Error 12). The TAGteach lesson outlined the need to stop at the end of each period to ensure she read each sentence in the manner in which the author intended. A tag was delivered for every period after which she paused. The intervention (see Figure 6) reduced Ignored Punctuation (Error 12) to zero following the first intervention session. Regina moved on to Intervention 2, which focused on Omissions and Partial Omissions (Error 5), for one session before the study was terminated due to the closure of the community center.

Henry scored at the early advanced level in the ELL Quick Start assessment, with an instructional level of 4th grade according to the graded word recognition list. Throughout baseline (see Figure 7 and Figure 8), Henry's most consistent reading errors were determined to be Substitutions and Mispronunciations that Disrupt Meaning (Error 1), Omissions and Partial Omissions (Error 5), Hesitations (Error 10), and Ignored Punctuation (Error 12). Due to the closure of the community center, Henry did not begin intervention on any of the errors.

Discussion

The current study adds to the literature on TAGteach being used to improve a variety of skills. TAGteach has been utilized to improve athletic performance (Harrison and Pyles, 2013; Stokes, Luiselli, Reed, and Fleming, 2010; Elmore, Healy, Lydon, and Murray, 2018) and fine motor skills (Levy, Pryor, and McKeon, 2016), and the current study provides a modified protocol focusing on oral reading. It can be inferred that the TAGteach intervention for improving oral reading fluency was effective in reducing the reading errors of Regina due to the utilization of the multiple baseline design. The data for Regina displays steady baseline responding and, once the TAGteach intervention was implemented, the errors reduced to near-zero levels. Moreover, anecdotal evidence collected during the study, including first-hand accounts from the teachers in the community center and the participants, suggests a high level of social validity consistent with anecdotal reports from Quinn, Miltenberger, and Fogel (2015). Following the first intervention sessions for Pedro and Regina, both requested to continue using the clickers for their reading and math homework. Additionally, the participants appeared eager to earn more tokens, as indicated by verbally sharing with others how many tokens they had earned that day. Despite not having the opportunity to implement a proper social validity survey, the anecdotal evidence may be indicative that the TAGteach intervention aligns with the best

classroom practices outlined by the NRP (2000) in utilizing feedback and guidance to dynamically engage students in the reading task. Additionally, the tagpoints provided immediate feedback and reinforcement to the participants to assist in differentiating their successes in oral reading (Cheung & Slavin, 2012). Future research should focus on fully completing the study and explore the benefits and limitations of TAGteach compared to other reading interventions used in the classroom settings.

There are several limitations that warrant consideration. First, the study had to be terminated before all errors had been targeted and before Henry was able to begin the intervention and for each participant to be reassessed. Due to the termination of the study, the researcher was unable to determine if TAGteach had any effect on the participants' oral reading performance or in comprehension questions concerning the text. Maintenance was not able to be assessed (LaMarca, Gevirtz, Lincoln, and Pineda, 2018), nor was any measurement of generalization possible (Fogel, Weil, & Burris, 2010; Harrison & Pyles, 2013; LaMarca, Gevirtz, Lincoln, & Pineda, 2018) thereby limiting the possibility of determining the effectiveness of TAGteach on improving oral reading fluency beyond the intervention phase. Future research should be conducted in its entirety to fully assess the participants' performance to determine the effectiveness of TAGteach.

Another limitation concerns the decision to begin intervention for Pedro in session five. Pedro's Omissions and Partial Omissions (Error 5) were reduced to near zero levels, however, the baseline data indicated a decreasing trend on the number of errors in session four before the intervention was implemented (see Figure 4). Baseline should have been extended to determine if the errors were decreasing due to possible practice effects or if the reduction in errors was

attributed to the TAGteach intervention. Future studies should ensure to extend baseline until data stabilizes before implementing the intervention.

The coding of the reading errors of the participants was another limitation of this study. Due to the time and resource constraints, the reading errors, specifically those related to substitutions (Errors 1, 2, 3, 11) lacked an additional miscue analysis to determine if errors were visual, structural, or meaning related (Clay, 1994). The miscue analysis information was not included in the Code and Scoring Guideline (Table 1) used to score the participants' reading errors. Thus, the researcher was unable to determine the types of errors that were made thereby missing valuable information used by educators in assessing the strengths and weaknesses of students in the reading process. Having the information on errors as either visual, structural, or related to meaning would have been valuable in determining if TAGteach is an effective intervention to improve performance per current classroom practices. Future research should ensure the adequate analysis of the reading errors.

Additionally, IOA and treatment integrity scores (73% and 83%) were low. Following the termination of the study and consequent scheduling difficulties, the trained second observer was unable to score the videos. An alternate observer was used to score the videos but they were not trained on the procedures or on the coding definitions of the errors. The lack of training may have obfuscated an accurate assessment of the inter-observer agreement and treatment fidelity. Along with proper training of the second observer, the script used to explain and model the TAGteach procedures should be expanded to include modifications. In explaining the TAGteach process (see Appendix A), the script was followed in its entirety but should incorporate additional sections to include the researcher asking the participants if they understood why a tag was given or why a tag was withheld. The additional comments were given when the participant

missed the opportunity to tag the researcher or tagged when a mistake was made on purpose. The comments are not included in the sample script provided by TAGteach International but including them will ensure the participants receive the necessary feedback if a mistake is made during the introduction to the intervention.

Despite these limitations, the current study was one of the first to apply TAGteach to reading, a high-order behavior, expanding the applications, and assessing the intervention beyond motor skills. The study was one of the first to evaluate TAGteach as a possible intervention for improving ELL students' oral reading fluency. Future research is needed to address the limitations and continue the evaluation of TAGteach to teach other academic skills to assist educators in the facilitation of learning, especially as the number of students needing help continues to increase.

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Table 1
Code and Scoring Guidelines of Graded Reader’s Passages

<i>Behavior as defined by the BRLI</i>	<i>Behavior operationally defined</i>	<i>Example</i>
1. Substitutions and mispronunciations that disrupt meanings	Words are replaced by structurally similar words / the word is partially pronounced incorrectly / the word does not fit the context of the sentence; <i>gaged</i> has a different meaning than <i>gazed</i>	<i>gaged</i> She gazed at it
2. Substitutions, mispronunciations, and inversions that do not disrupt meaning	Words are replaced by structurally similar words / the word is partially pronounced incorrectly / but the word fits the context of the sentence; <i>looked</i> has a similar meaning as <i>gazed</i> and does not alter the sentence	<i>looked</i> She gazed at it “I saw him,” Mary said
3. Repeated substitutions or mispronunciations for same word	Words are pronounced incorrectly or replaced consistently for three or more instances throughout the text	<i>Wafer</i> The water was . . . then the <i>wafer</i> water flowed
4. Insertions	Words are inserted into the sentence – the word may be novel, written in other sentences, or contextually appropriate but is not part of the sentence being read	A <i>^</i> little dog

<i>Behavior as defined by the BRLI</i>	<i>Behavior operationally defined</i>	<i>Example</i>
5. Omissions and partial omissions	Words are not read out loud / words are partially read	The ta ll girl He remembered d the dog
6. Words pronounced by the examiner	Participant requests help from researcher / participant does not read the word for approximately five seconds	<i>P</i> I thought
7. Repetitions of words or phrases	The words are repeated regardless of correct or incorrect pronunciation	<u> </u> <i>R</i> The cat howled
8. Self - corrections	Student says word incorrectly on first attempt but then says the correct word within 10 seconds of first instance of error	<i>C</i> <i>went</i> I want to
9. Repetitions to make corrections	Student says word incorrectly on first attempt but then engages in "sounding out" the word and repeating the correct word within 10 seconds of the first instance or error	<i>C</i> <i>Went</i> <i>I want to</i> I want to
10. Hesitations	Latency of five or more seconds in which student does not say the word	✓ He thought
11. Substitutions and mispronunciations resulting from a dialect	Substituted or mispronounced words are phrases from a language peculiar to a specific region or culture distinguished by grammar and vocabulary	<i>Be goin</i> She goes every day

<i>Behavior as defined by the BRLI</i>	<i>Behavior operationally defined</i>	<i>Example</i>
12. Ignored punctuation	The participant reads separate sentences together with no audible stopping to indicate the end of a sentence and starting a new sentence	The carX Then
13. Phrasing	Participant reads the sentence slowly word by word [as if to read a string of words in a “choppy” manner]	The/ car/ came down the street
A. Several words are omitted	The participant omits three or more words (including entire lines) in a row	She loved her puppy (so much that)-she even made a birthday cake!

Note. Item A was not a part of the BRLI scoring guide.

Figure 1

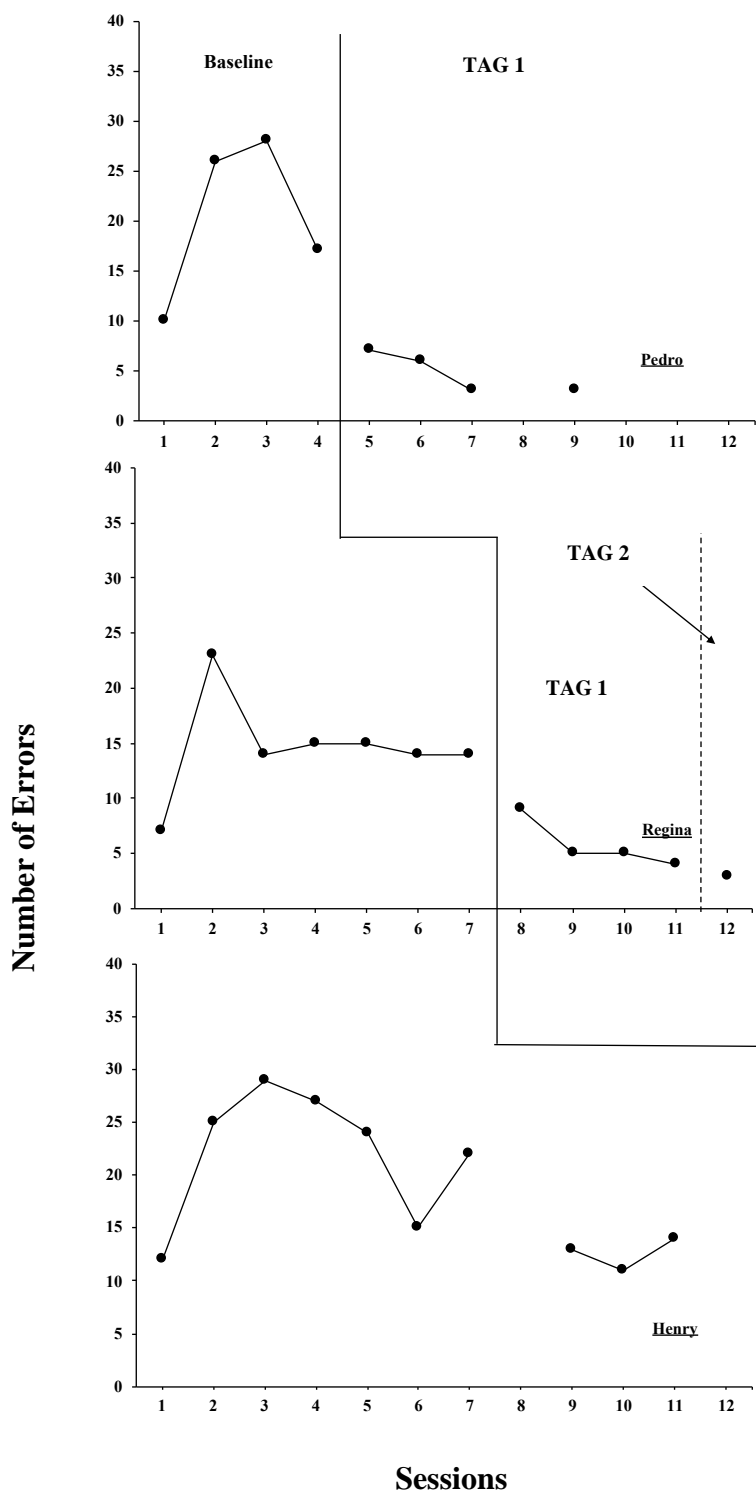


Figure 1. Multiple baseline graph of cumulative reading errors across Pedro, Regina, and Henry.

Figure 2

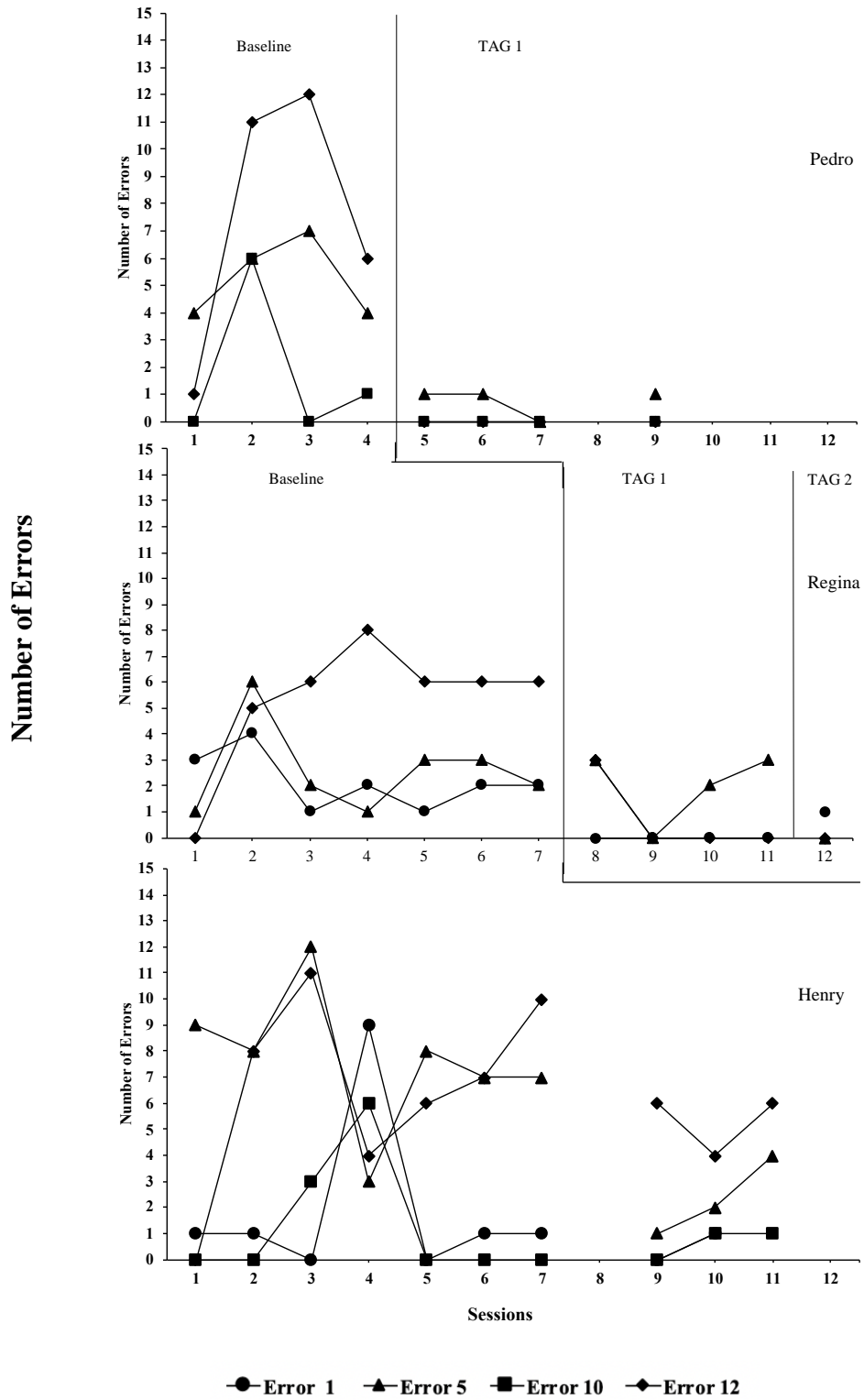


Figure 2. Multiple baseline graph of pulled reading errors across Pedro, Regina, and Henry.

Figure 3

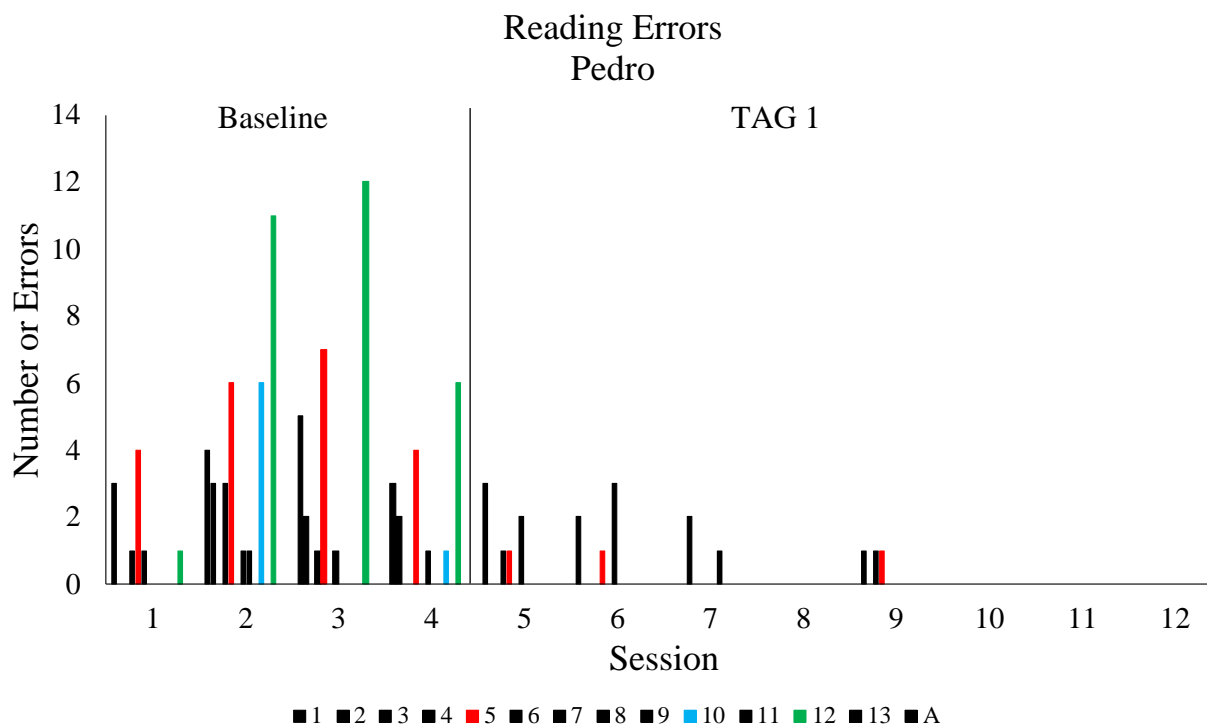


Figure 3. Distribution of reading errors across twelve sessions for Pedro. Sessions with no data indicate sessions in which Pedro was not in attendance. Legend at the bottom highlights the reading errors that were targeted with three separate colors for clarity. Omissions and Partial Omissions (Error 5) are highlighted in red, Hesitations (Error 10) highlighted in blue, and Ignored Punctuation (Error 12) highlighted in green. The first intervention focused on Omissions and Partial Omissions (Error 5).

Figure 4

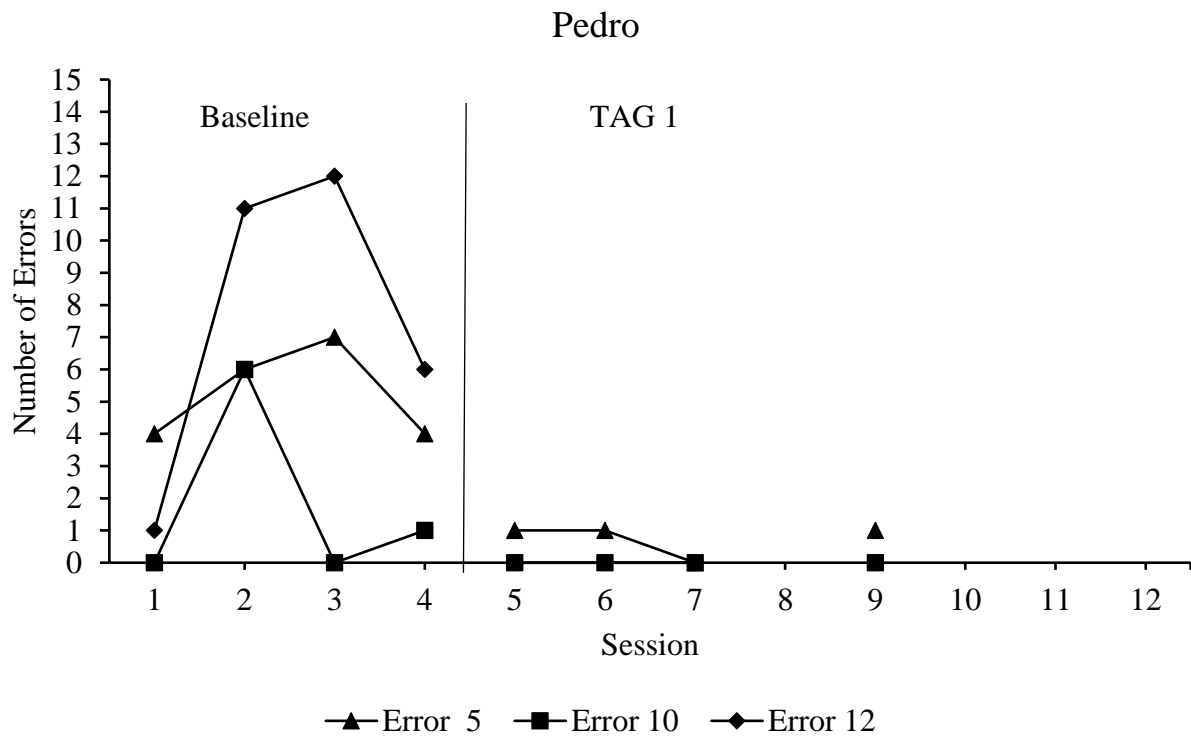


Figure 4. Throughout baseline, Pedro’s consistent reading errors were determined to be Omissions and Partial Omissions (Error 5), Hesitations (Error 10), and Ignored Punctuation (Error 12). The first intervention focused on Omissions and Partial Omissions (Error 5).

Figure 5

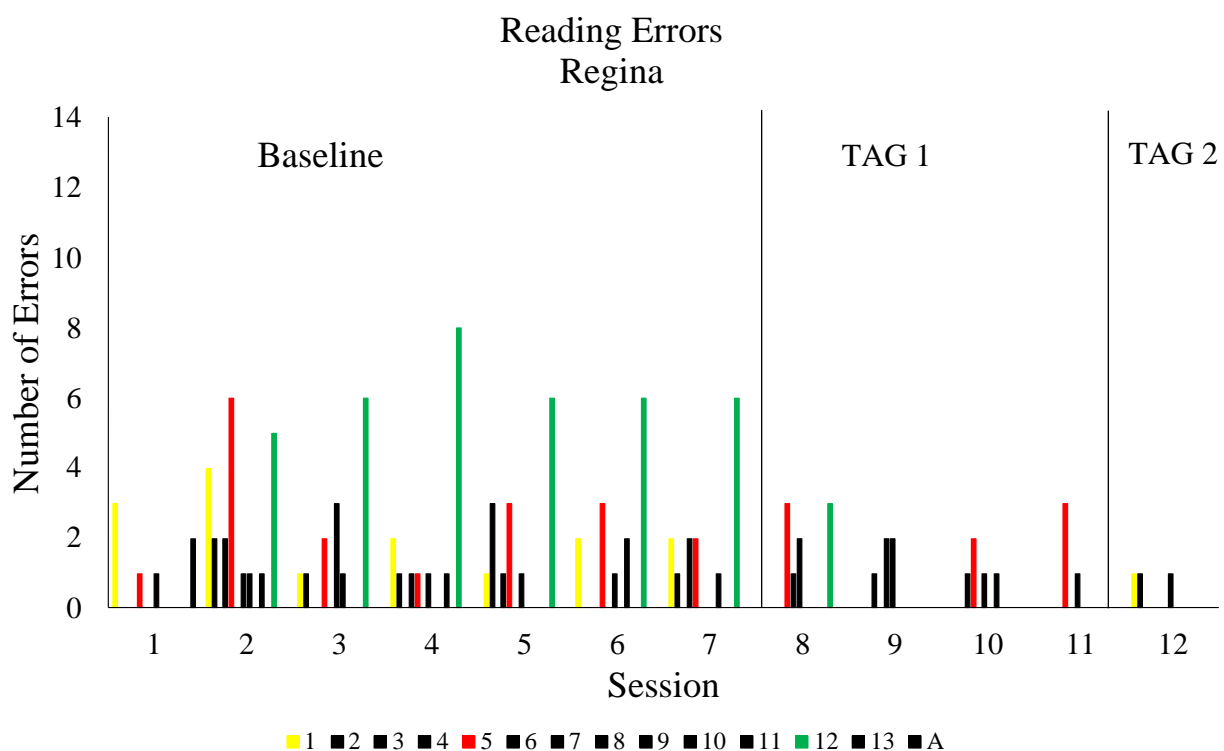


Figure 5. Distribution of reading errors across twelve sessions for Regina. Legend at the bottom highlight the reading errors that were targeted with three separate colors for clarity. Substitutions and mispronunciations that disrupt meaning (Error 1) are highlighted in yellow, Omissions and partial omissions (Error 5) are highlighted in red, and Ignored punctuation (Error 12) highlighted in green. The first intervention focused on Ignored punctuation (Error 12) and the second focused on Omissions and partial omissions (Error 5).

Figure 6

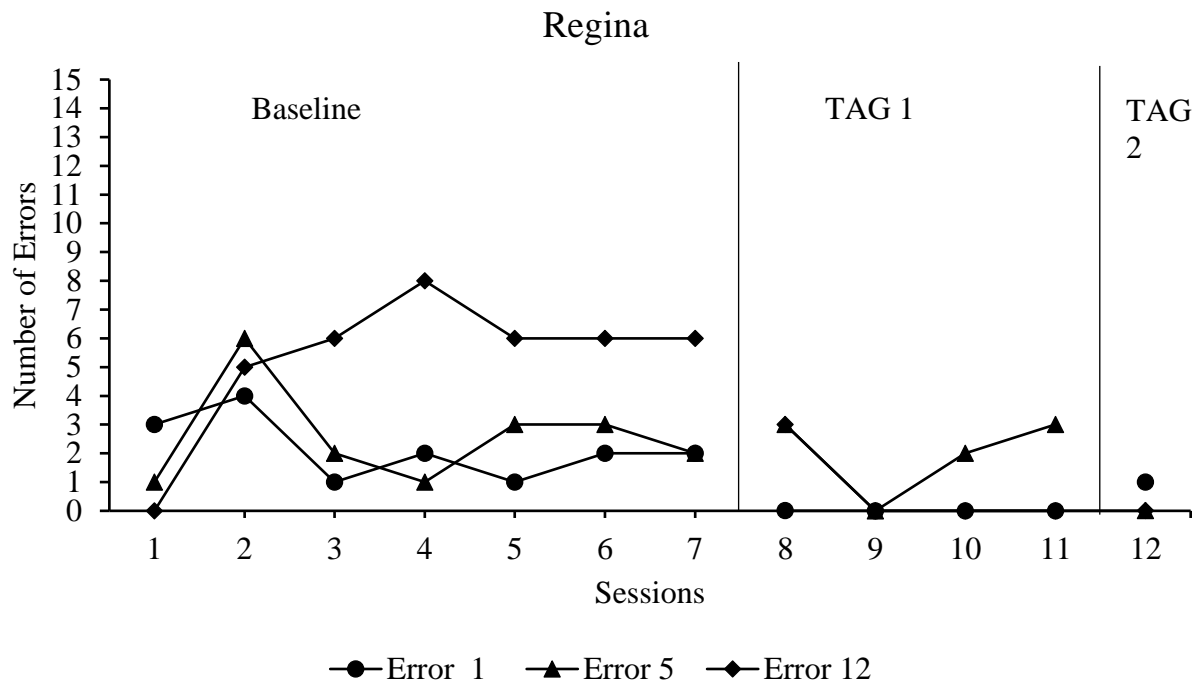


Figure 6. During baseline, Regina’s consistent reading errors were determined to be Substitutions and mispronunciations that disrupt meaning (Error 1), Omissions and partial omissions (Error 5), and Ignored punctuation (Error 12).

Figure 7

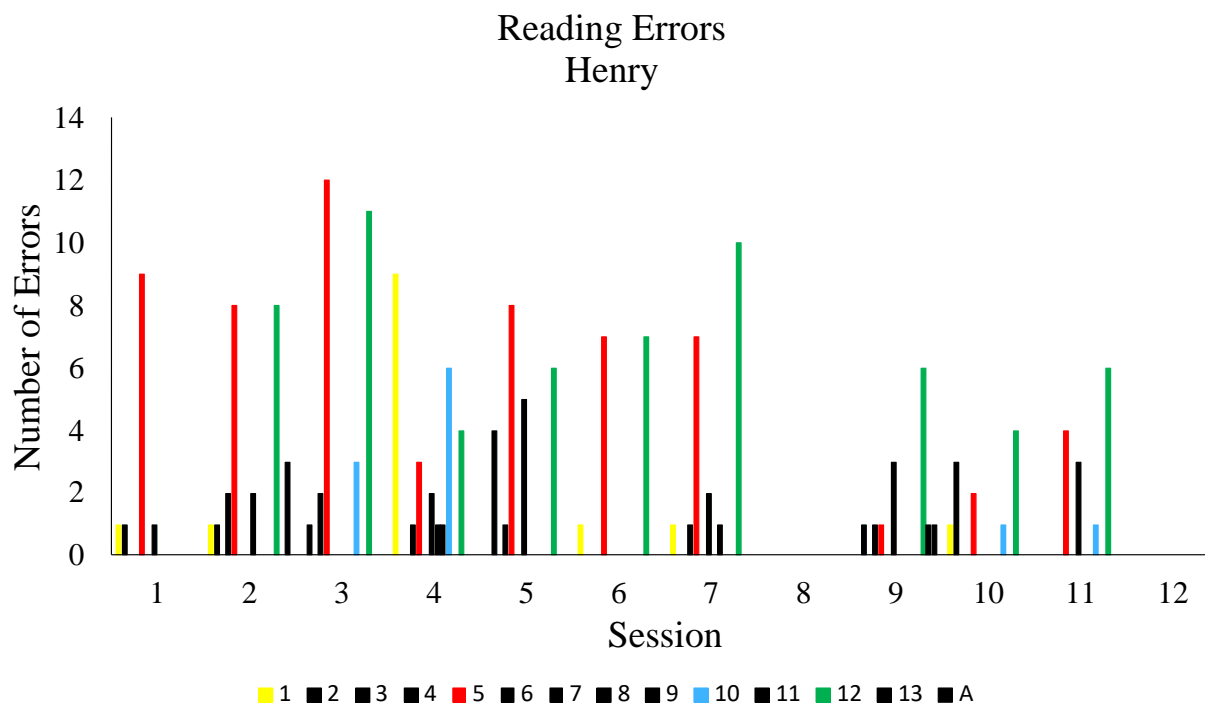


Figure 7. Distribution of reading errors across twelve sessions for Henry. Legend at the bottom highlights the reading errors that were targeted with four separate colors for clarity. Substitutions and mispronunciations that disrupt meaning (Error 1) are highlighted in yellow, Omissions and partial omissions (Error 5) highlighted in red, Hesitations (Error 10) highlighted in blue and Ignored punctuation (Error 12) highlighted in green. Sessions with no data indicate sessions in which Pedro was not in attendance. Henry did not start intervention in the study.

Figure 8

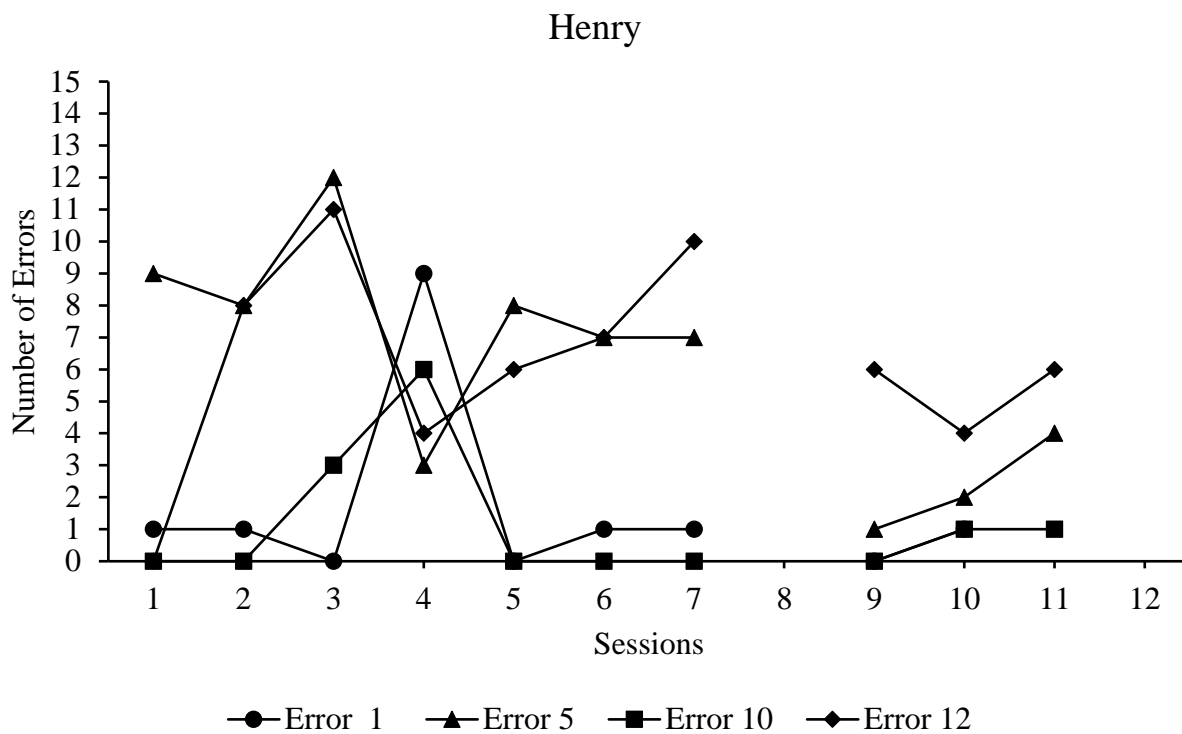


Figure 8. Henry's most consistent reading errors were determined to be Substitutions and mispronunciations that disrupt meaning (Error 1), Omissions and partial omissions (Error 5), Hesitations (Error 10), and Ignored punctuation (Error 12).

APPENDIX A

Sample Script for Error 5

1. Participant sits down
1. Researcher asks participant to select a couple of toys
2. Researcher explains that for every five tags the participant gets they gain access to the toy for three minutes [set on a timer]
3. Researcher States:
 - i. 'Today we're going to work on reading slowly'
 - ii. 'This is important because we need to make sure we read every word carefully'
 - iii. 'Here's what it looks like'
4. Researcher reads section and uses clicker for three instances [1. Correct instance | 2. Incorrect Instance | 3. Correct instance]
5. Researcher States:
 - i. 'Now it's your turn to tag'
6. The researcher gives the tagger to the participant
 - i. 'The tag point is read slowly'
7. Researcher reads two correct sentences and one incorrect sentence
8. The researcher states
 - i. 'Now it's my turn to tag'
 - ii. 'Can I have the clicker back please?'
 - iii. 'The instructions are read slowly'
 - iv. 'The tag point is read slowly'
9. The researcher tags the participant
10. Session ends on a success
 - a. either thanking student or exclaiming how many checkmarks they get or that they get to play with them

