Developing Reading Fluency of Students With Reading Difficulties Through a Repeated Reading Intervention Program in a Transparent Orthography

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In transparent orthographic systems, such as the Greek one, reading problems of students with reading disabilities are related mostly to reading fluency rather than to decoding. Consequently, systematic and explicit instruction in reading fluency is considered necessary. Therefore, our major research goal in this study was the development of reading fluency of three second-grade students, who faced severe reading difficulties through a multi-component intervention program. In particular, it was explored whether the use of specially designed texts in conjunction with specific instructional strategies can enhance the reading fluency of students with severe reading difficulties. The intervention followed a within-subject design including pretest /post-test measures without control groups. The intervention program lasted for two months and included 16 individual sessions. Four illustrated books with controlled texts were designed and used within the program. Regarding instructional strategies - model reading, assisted repeated reading, self-monitoring and reinforcement were implemented. Based on the results it was revealed that the intervention program had a high impact on reading fluency in the four instructional texts. Analysis of pretest and post-test scores showed that the intervention program had a different effect for each individual on the measured skills. No effect was recorded for students' reading fluency. However, the program significantly improved participants' reading comprehension. Implications and limitations of the study are included in the discussion.

Keywords: **reading fluency, repeated reading, dyslexia, intervention**

INTRODUCTION

Oral reading fluency is defined as the ability to read with speed, accuracy and prosody (NICHD, 2000), and reading fluency is characterized by efficient, smooth and effortless reading, with low level of attention on basic reading skills (Berninger et al., 2010; Therrien, 2004). Research findings have provided significant information on the relation that exists between reading fluency and automaticity (Breznitz, 2006). Based on the theories of "*Automatic Information Processing*" (La Berge & Samuels, 1974) and "*Verbal Efficiency*" (Perfetti, 1985), reading fluency serves as a bridge, connecting word recognition to reading comprehension, mostly during the early elemen-

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tary grades (Rasinski, 2010). A large body of research has supported that reading fluency is highly related to reading comprehension across a number of grades and languages, being a crucial predictor of it, as well (Hudson et al., 2012; Kuhn & Stahl, 2003; O'Connor et al., 2007; Schwanenflugel et al., 2006). Similarly, reading fluency was found to be a significant predictor of reading comprehension up to the eighth grade in Greek language (Padeliadu & Antoniou, 2013).

According to Seymour et al. (2003), the Greek orthographic system is positioned in second place behind the Finnish, in terms of syllabic structure and orthographic depth. Protopapas and Vlachou (2009) calculated Greek orthographic transparency at around 95% for reading and 85% for spelling. In regard to reading development in transparent orthographic systems, such as the Greek one, due to the high level of spelling-sound correspondence, after a few months of systematic instruction, students succeeded in learning decoding mechanisms and graphophonemic correspondences (Mouzaki & Sideridis, 2007; Wimmer, 1993). Porpodas (1999) showed that even poor readers are able to decode 98% of real words and 92% of nonwords with accuracy, even in first grade. Based on the above findings, it is suggested that reading disabilities in transparent orthographies are related mostly to reading fluency rather than to basic reading skills, with reading fluency difficulties being often the more profound characteristic of students with reading disabilities (Porpodas, 1999; Protopapas & Skaloumpakas, 2008; Wimmer, 1993). Therefore, in transparent orthographic systems, systematic instruction of reading fluency is considered imperative, since many students face difficulties in reading speed, despite their adequate decoding skills (NICHD, 2000).

In 1979, based on the theory of automaticity, Samuels introduced the method of repeated reading as a good way to support reading fluency. In repeated reading, students read a text or a part of it either for a predetermined length of time or for as many times as is needed to "reach" a predetermined performance goal of reading speed and accuracy (Samuels, 1979). Over the last forty years, a substantial number of reviews and meta-analyses have been conducted on reading fluency, targeting the effectiveness of repeated reading, and revealing the value of different strategies used within repeated reading interventions (Chard et al., 2002; Galuschka et al., 2014; Kuhn & Stahl, 2003; Meyer & Felton, 1999; Morgan & Sideridis, 2006; NICHD, 2000; Suggate, 2014; Therrien, 2004). It appears that several strategies for developing students' reading fluency remain popular, although lacking strong supporting evidence. Reading fluency intervention programs have lower levels of improvement, compared to other reading programs, such as phonemic awareness and decoding (O'Connor et al., 2007; Torgesen & Hudson, 2006). On the other hand, reading fluency appears to be the major indicator of reading disabilities in transparent orthographies, such as the Greek one (Protopapas & Skaloumbakas, 2008; Wimmer, 1993). Taking into consideration the aforementioned, the need for identifying specific components or strategies that can lead to reading fluency improvement is imperative.

Padeliadu and Giazitzidou (2018) conducted a synthesis of research on reading fluency development, examining the results presented by eight relevant meta-analyses. According to them, the most effective reading fluency strategies combined with repeated reading are goal-setting, self-monitoring and reinforcement. In addition, they concluded that guidance, provided by an adult, model reading and text

preview are also effective intervention components in reading fluency instruction, especially for students with reading disabilities. According to National Reading Panel (2000), repeated reading interventions have significant impact on reading accuracy ($d' = 0.55$), reading fluency ($d' = 0.44$) and reading comprehension ($d' = 0.35$).

Many experimental studies have been conducted, using different combinations of specific repeated reading strategies. Experiments were different in terms of duration, instructional components, design, methodology, level of training (word, text), participants' reading and cognitive characteristics and level of orthographic transparency (Faulkner & Levy, 1994; Katzir et al., 2006; Kourea et al., 2018; Lo et al., 2011; Rashotte & Torgesen, 1985; Young et al., 2015). For instance, in a study involving elementary students, who performed poorly in reading, O'Connor et al. (2007) found that an intervention program, combining repeated reading with model reading, led to significant development of both reading fluency and comprehension. Those results were replicated in a study by Ardoin and his colleagues (Ardoin et al., 2013), who indicated that repeated reading with performance feedback led to an improvement in all components of reading fluency, including prosody, in typically developing elementary students. Furthermore, Ring et al. (2012) compared two reading fluency intervention programs for students at-risk of reading failure. One program focused instruction on the word level and the second one on the text level. As revealed from the results, both treatment groups showed similar transfer to text-level reading fluency. In addition, both of them showed similar modest gains in reading accuracy and speed.

Similar results are supported by repeated reading intervention programs conducted in transparent orthographies (De la Colina et al., 2001; Huemer et al., 2010; Kodan & Akyol, 2018; Soriano et al., 2011). For instance, Huemer and her colleagues (Huemer et al., 2010) conducted a study among poor readers in Finnish, grades 4 to 6, using switching replication design. The training material included syllables, which were practiced during 10 training sessions for a total of 50 times. According to their findings, the reading speed of pseudowords containing the already taught syllables improved significantly during the training, showing a transfer effect from the syllable-level training to multisyllable pseudoword reading. However, reading speed gains did not become evident at a text reading task. Another relevant multi-component program applied with Spanish students aged 10-13 with reading disabilities, led to similar results. The program consisted of repeated reading plus phonological awareness training and grapheme-phoneme decoding training. Based on the results, it was shown that students who received the intervention program showed significant and large gains in word, pseudoword and text reading accuracy and speed. No significant improvement was found in reading comprehension. It seems that repeated practice of the words in context develops orthographic representation. Moreover, another possible reason for the fluency gains is the intensity of the intervention (40 sessions) (Soriano et al., 2011).

Instructional texts used in reading fluency interventions appear to have an important role in their effectiveness as well, having a significant impact on reading accuracy and speed (Hiebert, 1999). Rashotte and Torgesen (1985) and Faulkner and Levy (1994) conducted the first two relevant studies, examining the role of text in reading fluency instruction. According to their results, Rashotte and Torgesen (1985)

suggested that the positive effect of repeated reading lies in the number of overlapping words among the different instructional texts, i.e., the number of the same words used across the instructional texts. However, Faulkner and Levy (1994) stated that not only overlapping words but also overlapping meaning among the different instructional texts contribute to reading accuracy and speed development. In terms of linguistic features, phonemic characteristics and familiarity of words affect the decoding processes to a great extent (Hiebert & Fisher, 2005). Beginner readers and students with reading disabilities decode more accurately and faster phonologically regular words, compared to irregular ones (Mesmer, 2001; Schwanenflugel et al., 2006). Also, students automatically recognize high-frequency words, since they encounter them more often (Kuhn, 2011; Hiebert & Fisher, 2005; Hoffman et al., 2001). In general, phonologically, orthographically and semantically familiar representations are more likely to be retained and retrieved faster, due to their existing connections to long-term memory (Adams, 1990; Share, 2004).

In addition, the readability level of instructional texts plays an important role in reading fluency interventions. However, there is a lack of agreement among researchers about which level is the most effective for reading fluency instruction. For instance, Clay (2000) indicated that repeated reading of easy texts supports the construction of orthographic knowledge since the reader has the opportunity to pay attention to graphemic representations. In contrast, Kuhn and Stahl (2003) proposed texts at the instructional or frustration level. On the other hand, Chard et al. (2002) and McGuinness (2004) showed that the effectiveness of a readability level depends on the reading skills of each reader. Specifically, for beginner readers, the best texts for reading fluency instruction may be those that are within students' instructional reading levels or slightly higher. Nevertheless, the use of texts especially designed, taking into consideration both the reading level of the students and specific linguistic features, appears to be a prerequisite for an effective reading fluency intervention program.

Although repeated reading has been widely used as the basis of reading fluency intervention programs, most of the relevant studies have been developed within phonologically deep languages (Ardoin et al., 2013; Katzir et al., 2006; Lo et al., 2011; O'Connor et al., 2007; Rashotte & Torgesen, 1985; Ring et al., 2012; Young et al., 2015). However, reading fluency difficulties appear to be the major characteristic of students with reading disabilities in shallow languages, such as the Greek one (de Jong & van der Leij, 2003; Wimmer, 1993). The present study attempted to expand existing findings on repeated reading effectiveness, aiming especially to improve reading fluency development of second-grade students, who struggle in reading Greek. Particularly the goal of the present study was the reading fluency development of three Greek second grade students, who faced severe reading difficulties, through a repeated reading intervention program in a transparent orthography. In particular, it was explored, whether a combination of the most evidence-based repeated reading strategies (previewing, repeated ring with feedback, repeated reading with goal-setting and self-monitoring, text model reading) with the use of controlled and especially designed texts may improve the reading fluency of students with severe reading difficulties. The current study was guided by the following research questions:

1. Does a repeated reading intervention program with especially designed texts improve reading fluency in instructional texts in a transparent orthography?
2. Does a repeated reading intervention program with especially designed texts improve general reading fluency and comprehension skills in a transparent orthography?

Method

The study was an experiment with a within-subject design (van Peer et al., 2012), including pretest /post-test measures, without control groups. This approach is suitable for small samples and avoids any influence by individual differences among participants that becomes an issue in between-subjects designs. The present method belongs to small-sample research designs used to evaluate the usefulness and effectiveness of treatments for individual cases. The focus on each individual case is a determined element of relevant intervention or treatment processes, such as evidenced-based rehabilitation. In the present research, the data collection involves the recording of the performance in reading fluency as short time series, where the *intra-individual* variability is being studied. Initially, a standardized reading test was administered to students. Subsequently, a two-month intervention program, from May to June, was implemented and finally, the same standardized test was administered again. The intervention program included 16 individual sessions of 30 minutes each. Four different instructional texts were developed and used. Sessions were held at students' schools in separate and quiet classrooms by the author SG.

Participants

The participants were one girl and two boys, who were attending three different general education public schools in Thessaloniki, the capital city of Northern Greece. All participants had a formal diagnosis as at risk for Specific Reading Difficulties by the local Public Service Office for Special Needs Diagnosis. No other disability was identified. Participants were selected based on specific criteria. Firstly, they had regular school attendance and were Greek native speakers. Secondly, they had severe reading difficulties, mostly in reading fluency, based on the results of the Greek standardized reading test, (DADA, Padeliadu et al., 2019). Furthermore, students were not involved in any other individualized or group reading intervention program beyond the core reading instruction. Finally, parental consent was obtained. A precise description of individual profiles of each participant follows.

Helen. Helen was a 7-year-old girl (7 years and 10 months), who was attending an "Extended Regular School Program" (until 16:00). According to the views of her parents, teacher and head principal, Helen was a friendly and collaborative girl. She had a positive attitude towards school and her social skills were well developed. She had friends and participated in group games during the breaks. Moreover, she had developed good oral language skills. Helen's participation during the lessons was limited and often she was distracted. According to a DADA assessment, Helen had low reading skills, compared to her peers. She performed lower than the 90th, 95th and 60th percentile in decoding, reading fluency and reading comprehension, respectively.

Paul. Paul was a friendly 7-year-old boy (7 months and 5 months). He had a positive attitude towards school and was a popular student. He had many friends and he participated in group games. He was good at verbal activities. However, he was facing severe problems in language lessons, since he was writing and reading too slowly, compared to his peers. According to a DADA assessment, Paul had low reading skills. He scored lower than the 80th, 90th and 40th percentile in decoding, reading fluency and comprehension subtests, respectively.

George. George was a 7-year-old boy (7 years and 10 months), who was attending a Multicultural School. The school was participating in a "free lunch" program. George was a calm and friendly boy. Greek was his mother language. He had friendly relationships with his peers, without however keeping a close relationship with any of them. He had a negative attitude towards school. He was facing severe problems in language courses and most of the time he was distracted. According to his teacher's view, George had developed good logical and abstract thinking in mathematics. According to a DADA assessment, George had low-level reading skills. He scored lower than the 90, 99th and 70th percentile in decoding, reading fluency and reading comprehension, respectively. Table 1 presents the participants' standard scores per subtest of the standardized DADA test.

Table 1. *Standard scores in reading skills according to DADA test*

Participant	Word decoding	Real word identification	Word recognition	Reading fluency	Reading Comprehension
Helen	10	15	10	5	40
Paul	20	30	70	10	60
George	10	30	35	1	30

Instruments and Procedures

The Standardized Reading Test

Reading assessment of students was conducted using the standardized reading test DADA (Padeliadu et al., 2019). In the word decoding subtest, students are asked to read as accurately as possible 57 real words of ascending difficulty. In the real word identification subtest, students are asked to identify the real words among pseudowords. This subtest consists of 33 items. 18 are real words and 15 pseudowords. For the word recognition subtest, students are asked to choose one out of the three words that matches a picture. The three words are similar in terms of phonology and orthography. This subtest consists of 78 words. For reading fluency evaluation, students are asked to read orally an expository text as accurately and fast as they can for one minute. The text consists of many multisyllabic and difficult words. The subject of the text refers to Greek mythology and it is familiar to elementary students. In the reading comprehension subtest, students are asked to read orally or silently six passages of ascending difficulty in order to answer the seven multiple-choice questions, for each passage. According to the constructors of the test, omega reliability coeffi-

cients for decoding and reading comprehension subtests are equal to .895 and .640, respectively. On the other hand, for the reading fluency subtest, test-rest reliability corresponds to .975 (p < .001).

Instructional Texts

Four controlled texts were developed and used in the intervention for cultivating students' reading fluency. Texts were presented in four small illustrated books. Texts contained controlled vocabulary, syntax and content. Texts' readability levels were within participants' reading instructional levels. Readability level was calculated using specially designed software for Greek texts (https://paroutsas.jmc.gr/different/rdblty.php). Texts contained phonologically regular words with simple syllabic and orthographic structure, high-frequency and familiar words, which were repeated many times throughout the texts. Each text focused on teaching one or two high-frequency consonant clusters, which were included in many repeated words. Furthermore, texts had short and simply structured sentences. Use of adverbs and pronouns was limited. The psycholinguistic features of each instructional text are presented in Table 2.

Table 2. *Psycholinguistic features of the instructional texts*

	"The little bear Mirka" *"í mikrí arkúða mírka"*	"Party in a train" *"párti sé tréno"*	"The stars of the castle" *"tá ástra tú kástru"*	"The sparrow" *"tó spurjíti"*
Readability level	88,87%	90,82%	91,85%	83,58%
Total number of:				
words	191	153	217	253
sentences	37	35	44	43
syllables	375	324	400	511
syllables per word	1.96	2.12	1.84	2.02
words per sentence	5.16	4.37	4.93	5.88
words with simple syllabic structure (CVC)	81	51	86	116
high-frequency words	83	68	90	120
multisyllabic words (> 4 syllables)	6	9	8	13
consonant cluster repetition	kr: 36 / rk: 25	tr: 32 / rt: 19	str: 46	rj: 17 /jr: 29
repeated words	30 words (2 to 14 repetitions)	23 words (2 to 8 repetitions)	38 words (2 to 9 repetitions)	47 words (2 to 12 repetitions)

Power-Point Program

The words of each text with consonant clusters or complex syllabic structure were taught independently through a specially designed Power-Point presentation. Format and sequence of slides for each presentation were predetermined. Firstly, a syllable including the instructional consonant cluster was presented followed by a word including this particular cluster. Then, another syllable with the same consonant cluster and a word with this particular cluster were presented. Slides were repeated three or four times in the same format for each presentation. In the first trial, slides were changed by the student, by clicking on the space bar.

Self-Monitoring Graph-Cards

A total number of eight graph-cards were designed to record performance during the self-monitoring strategy. Two graphs-cards were presented for each text. The first card was used to record reading time and the second one to record reading accuracy. The performance goal was determined by the researcher based on the student's reading level. The student recorded his/her performance on his/her own for each reading trial. When the participant "reached" the predetermined speed and accuracy reading goal, he/she received as a reward a symbolic gift.

Instructional Strategies

Different instructional strategies were used in order to improve students' reading fluency. Specifically, the applied instructional strategies were: previewing, text model reading provided by the researcher, repeated reading of text with feedback, self-monitoring and reinforcement. Moreover, a specially designed presentation on Power-Point for word level instruction was used. Instruction of each book was completed through four phases. The same teaching procedure and phases were followed for each book. The applied instructional strategies and their sequence of phases are presented in detail in Table 3.

Table 3. *Structure of the intervention program: Phases and instructional strategies per book*

Pre-test	1st phase	2nd phase	3rd phase	4th phase	Post-test
Administration of the standardized test DADA	Previewing of text	Pre-teaching of text words through PowerPoint	Pre-teaching of text words through PowerPoint	Pre-teaching of text words PowerPoint program	Administration of the standardized test DADA
	Model reading of text by the researcher	Model reading of text by the researcher	Model reading of text by the researcher	Text independed reading	
		3 RR plus feedback	RR plus self-monitoring and reinforcement		

Note. RR = repeated reading.

Results

In the present study we examined whether the use of evidence-based repeated reading strategies in conjunction with controlled and specially developed texts may improve reading fluency of students with severe reading difficulties. All analyses refer to each of the three participants, separately. Presentation of the results is divided into two parts. In the first part, an analysis of the reading fluency progress in instructional texts is presented, while in the second part, the effectiveness of the intervention program on reading fluency and reading comprehension is demonstrated via the implementation of pretest and post-test examinations, as measured by the standardized reading test DADA. The evaluation of reading fluency was expressed by correct words per minute.

Regarding the first research question, the improvement of reading fluency is demonstrated via the acquired progress gained through the course of subsequent sessions. Reading fluency is expressed as the number of correct words per minute (CWPM). Errors refer to phoneme or syllable substitutions, additions, reversals and subtractions. Any self-correction was perceived as correct. In expressing quantitatively the apparent trends of growth, the mean scores of fluency in every serial-numbered trial across the four texts were calculated, i.e. the first trial scores in the first, second, third and fourth text, were averaged to express the bottom line of fluency performance. The corresponding mean scores of reading fluency were calculated for the second, third, fourth, fifth, sixth and seventh iteration. These scores, for each participant, were plotted versus the iteration number and the resulting graph (Figures, 1, 2 and 3) demonstrated the change of fluency performance over time. Time is implicit here, represented by the sequential trials taking place during the intervention process. Simple liner regression models were fitted to the data of each participant.

Table 4 shows the results of the linear regression analyses including adjusted-R^2 expressing the variance explained adjusted for the sample size, the calculated slopes, *(b)*, standard errors of *b*, standardized slopes ( ), t-tests and statistical significance. The slope *b* represents the mean increase in fluency performance as the number of trials increases by one, and expresses the effect of the intervention program on each student. The calculated slopes were statistically significant: $b= 4.33$, $p<0.001$ for Helen; $b = 5.01$, $p<0.001$ for Paul and $b= 2.97$, $p<.001$ for George. Moreover, auxiliary analysis supported the normality of the residuals in all cases (Kolmogorov-Smirnov and Saphiro-Wilk tests had $p > 0.20$). The above, along with the high variances explained ($R^2 = 0.97$, 0.94 and 0.94 for Helen, Paul and George, respectively) demonstrated an excellent model fit supporting the conclusion that the repeated reading of controlled texts significantly predicted reading fluency of each participant at $p <0.001$. In addition, given the small number of points, the bootstrap technique was used to compute the *p*-values for the estimated slopes. Results based on 1000 bootstrapped samples, provided *p*-values of 0.031, 0.011 and 0.021 for Helen, Paul and George, respectively.

Table 4. *Results of linear regression analyses: Adjusted R², slopes (B), standard errors (SE) of B, standardized slopes (β), t-test and model F.*

|	Adj R^2	B	$SE\ B$	$β$	t	F
Helen	0.98	4.33	.31	.98	13.97***	188.7***
Paul	0.94	5.01	.52	.97	9.63***	91.92***
George	0.94	2.97	.31	.97	9.58***	92.51***

*Note. *p <0.05, **p <0.01, ***p <0.001. Note 2:* Results based on 1000 bootstrapped samples, provided *p*-values of 0.031, 0.011 and 0.021 for Helen, Paul and George, respectively.

In terms of individual progress, Figure 1 shows the improvement of Helen's fluency performance for each reading trial over the four texts. The largest increase is observed from the fourth to fifth reading trial, by 7.77 CWRP and from the sixth to seventh reading trial by 6.6 CWRP. The overall improvement between the first and the last reading trial was calculated to 27.5 CWPR.
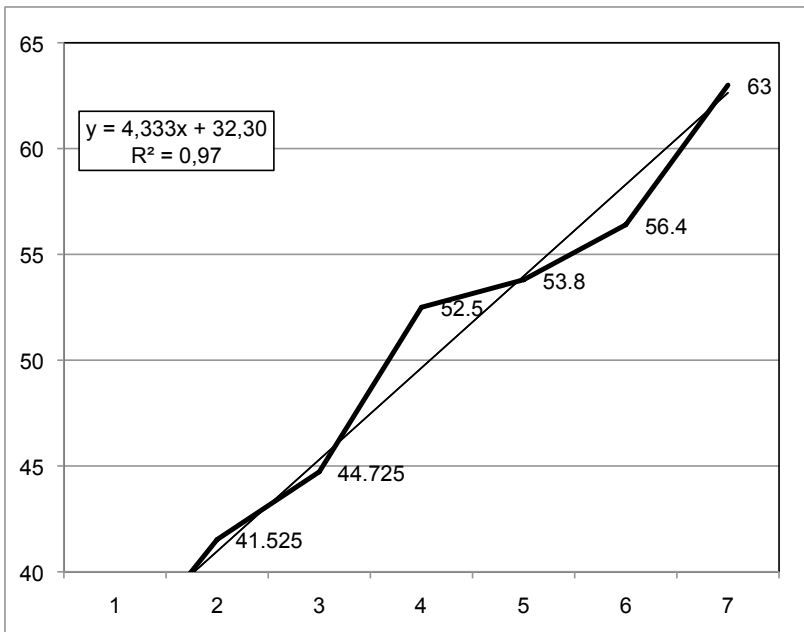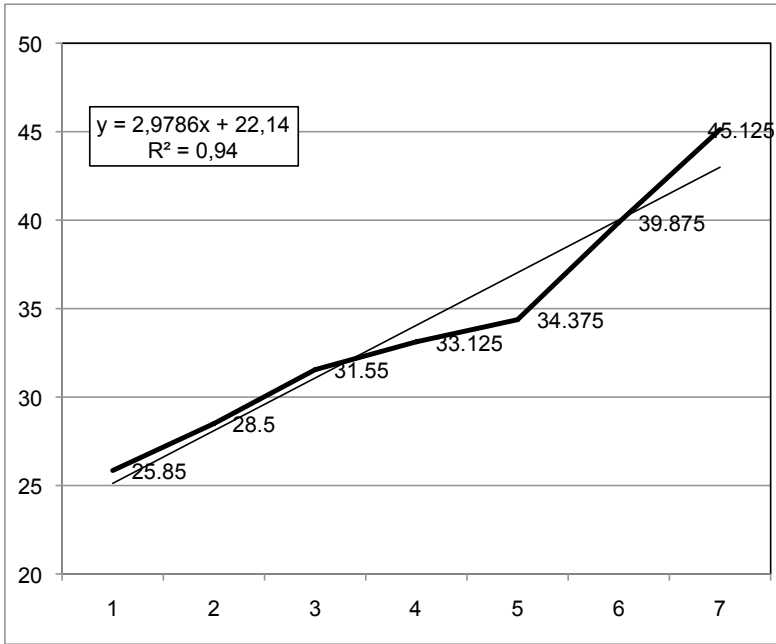

Figure 1. **Increase of Helen's reading fluency performance as a function of the iterated reading interventions (Adj. R2= 0.97, standardized slope β =0.98, p<0.001)**

Similarly, Paul's (Figure 2) larger increase in reading fluency is observed from the first to the second reading trial (7.8 CWPM) and from the third to the fourth one (9.34 CWPM). In total, the difference in reading fluency between the first and the last reading trial was large (30.15 CWPM).
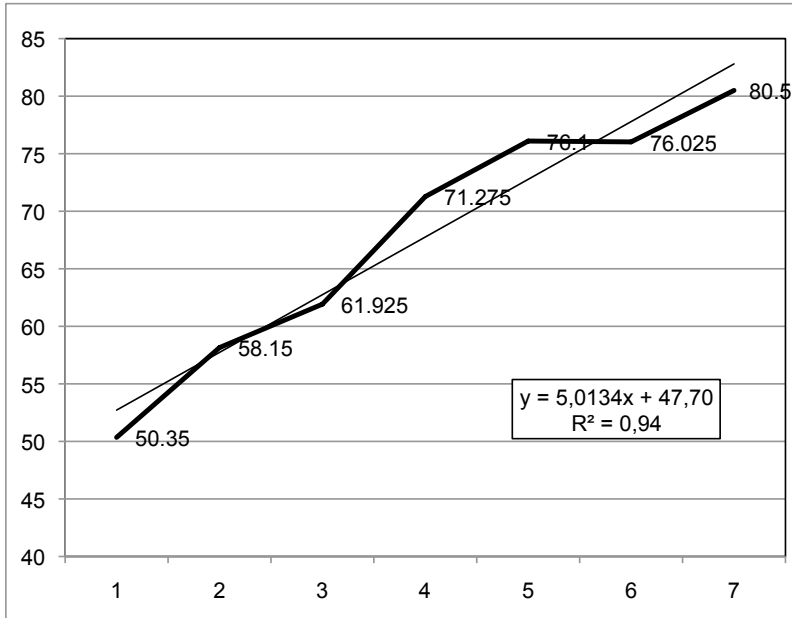
Figure 2. **Increase of Paul's reading fluency performance as a function of the iterated reading interventions (Ad. R2= 0.94, standardized slope β =0.97, p<0.001)**

George recorded a different pattern of reading fluency progress, compared to Helen's and Paul's, documenting a low improvement (Figure 3). In the first five reading trials, reading fluency improvement ranged between 1.25 to 3.05 CWPM, with an increase in the last two reading trials (5.5 CWPM and 5.28 CWPM, respectively). Nevertheless, the performance difference between his first and his last reading trial was calculated to 19.27 CWPM.

Figure 3. **Increase of George's reading fluency performance as a function of the iterated reading interventions (Ad. R2= 0.94, standardized slope β =0.97, p<0.001)**

With regard to the second research question, the effect of the intervention program on reading fluency and comprehension skills was examined through the administration of the standardized reading test DADA (Padeliadu et al., 2019). The differences in scores between the pretest and post-test are presented both by raw and percentile scores. The results of each subtest for each participant are presented separately. A presented pattern of change in Table 5 was similar across the three participants for reading fluency. Although participants increased their scores in correct words per minute, their percentile score remained the same. Helen increased her reading fluency performance by four CWPM, which placed her in the lowest 5th percentile. Paul improved his reading fluency performance by two CWPM, reading 41 CWPM in the post-test, which is equivalent to the lowest 10th percentile. Finally, George increased his performance by two CWPM, reading 18 CWPM in the post-test, which corresponds just to the 1st percentile. Regarding the reading comprehension subtest, participants increased their performance to a large extent both in raw and percentile scores. Helen improved her performance by 11 correct answers, with her performance in the post-test corresponding to the 90th percentile. Similarly, George and Paul increased their reading comprehension, with their scores in the post-test corresponding to the 80th and 40th percentile, respectively.

Table 5. *Raw and percentile scores of pretest and post-test of reading fluency and reading comprehension per participant*

Participant	Measure	Reading fluency		Reading Comprehension	
		Raw	Percentile	Raw	Percentile
Helen	Pre-test	22	5	18	40
	Post-test	26	5	29	90
Paul	Pre-test	39	10	24	60
	Post-test	41	10	28	80
George	Pre-test	16	1	13	30
	Post-test	18	1	19	40

The findings presented above illustrate the effectiveness of the intervention program on participants' reading fluency in instructional texts. Moreover, in post-tests, participants increased their performance in raw scores in every subtest, while they improved their percentile scores to a large extent in reading comprehension. In particular, according to the study post-test results, it appears that the greater influence of the intervention program was documented in Helen's performance. Participants' performance pattern was similar for the reading fluency subtest. They improved their scores in raw rates, remaining however, stable in their percentile scores. Finally, the intervention program had a large effect on reading comprehension, as measured by a DADA subtest.

DISCUSSION

The major goal of this study was to improve reading fluency of three second grade students through a multi-component repeated reading intervention program. In particular, it was explored whether a combination of evidence-based repeated reading strategies and controlled texts leads to the improvement of reading fluency of students with severe reading difficulties. The study had a pre-test and post-test design and the intervention effectiveness was examined through a standardized reading test. As shown by the results, reading fluency can improve substantially and to a great extent in the instructional texts, without however any transfer to reading unfamiliar texts. This finding is in accordance with the suggestions that development of reading fluency is difficult to be achieved and may need long-term interventions (Hintikka et al., 2008; O'Connor et al., 2007; Torgesen & Hudson, 2006). It is possible, that other types of reading fluency intervention programs could be more appropriate and more effective for students with reading difficulties. Nevertheless, based on the analysis of our data, it is suggested that implementation of a repeated reading program in combination with controlled instructional texts may lead to substantial progress in reading comprehension.

Considering reading fluency in the instructional texts, the analysis of our data revealed that implementation of a repeated reading fluency program is highly effective. The use of evidence-based reading fluency instructional strategies in com-

bination with controlled and specially designed texts had a significant and high effect on reading fluency in instructional texts. The comparison between the first and the last reading trial in these texts yielded substantial differences in reading fluency for all three participants, with progress recorded for every subsequent reading of the same text. Furthermore, repeated reading with goal-setting and reinforcement had the highest effect on reading fluency, with coefficient beta corresponding to four and three CWPM for each reading trial. Our findings support Morgan and Sideridis (2006) meta-analysis findings, where repeated reading and goal-setting reinforcement led to significant change in reading fluency development, with progress ranging between three to five CWPM for each participant. The positive impact of repeated reading practice on reading fluency is supported by studies conducted in other transparent orthographies (De la Colina et al., 2001; Huemer et al., 2010; Kodan & Akyol, 2018; Soriano et al., 2011). Huemer and her colleagues (Huemer et al., 2010), working with poor readers in Finnish, grades 4 to 6, reported that the reading speed of pseudowords improved significantly after training containing the syllables included in the pseudowords, revealing a transfer effect from the syllable-level training to multisyllable pseudoword reading. Nevertheless, similar to the findings in our study, reading speed gains did not transfer to a control text reading task.

It is interesting that reading fluency progress in instructional texts was not the same across participants, with Helen and Paul documenting much higher progress, compared to George. One could assume that the initial participants' different reading skills played a mediating role in their reading fluency progress during the program, since George's reading skills were at the lowest level, compared to the others. Moreover, it is possible that George's negative attitude towards school and the learning process had a negative effect on his intervention responsiveness.

Regarding the type and the psycholinguistic features of the instructional texts, the results of the present study underlined their significant role in reading fluency instruction. Similar findings were reported in Hiebert's studies (2005, 2006), who examined the role of text psycholinguistic features in reading fluency performance of students with and without reading disabilities. Specifically, she compared the effectiveness of FORI, a reading fluency intervention program, using two different text conditions. In one experimental condition, she used school texts and in the other one, controlled texts with particular psycholinguistic features. Instructional texts were composed of short and high-frequency words. Participants in the second condition improved their reading fluency performance between the first and the last reading trial by 30 CWPM. Similar progress in reading fluency was recorded between the first and the last reading trial in this study, as well. In general, text features appear to be a prominent factor influencing to a large extent reading fluency performance, mostly for beginning readers and students with reading disabilities (Hiebert & Fisher, 2005).

In addition to the significant role of word psycholinguistic features, syntactic structure was a substantial factor, affecting reading fluency performance, as well. The results of our study are consistent with Mesmer's findings, since the reading speed in instructional texts, which were characterized by repeated syntactic structure, was significantly better, even by the first reading trial, compared to their performance in the DADA reading fluency subtest. As shown by the results of Mesmer's

(2001) meta-analysis on the role of texts in reading fluency instruction, texts which are composed of repeated syntactic structure significantly affect reading speed, since repeated syntactic structure allows the readers to remember the linguistic repeated patterns and read them faster and faster in every subsequent attempt. In general, our findings reveal that a combination of repeated reading strategies in conjunction with controlled text, with particular psycholinguistic features, may support to a great extent reading fluency in instructional texts of students with severe reading difficulties.

Based on our pre-test and post-test results, the intervention program had a positive effect on particular reading skills. Although reading comprehension developed significantly almost for every participant, reading fluency progress observed in instructional text was not generalized to unknown ones. This finding is in line with the results of similar studies (Huemer et al., 2010; O'Connor et al., 2007), suggesting that reading fluency does not develop as easily as decoding skills (O'Connor et al., 2007; Torgesen & Hudson, 2006). Therefore, it requires not only long-term interventions (Lo et al., 2011; O'Connor et al., 2007; Therrien et al., 2011), but a large number of overlapping words among the instructional texts as well (Meyer & Felton, 1999; Therrien, 2004). As Rashotte and Torgesen (1985) suggested, reading fluency generalization requires that instructional texts comprise of a large degree of overlapping words, approximately 60 common words out of 100.

Different results emerged from a repeated reading study conducted with Spanish students aged 10-13 with reading disabilities regarding reading comprehension improvement (Soriano et al., 2011). According to this study, despite the significant gains reported in reading fluency, no significant development was found in reading comprehension. It is possible that reading comprehension improvement in older students is based on higher-level linguistic skills, such as metacognitive skills or on the development of vocabulary. On the other hand, cultivation of reading fluency in younger at-risk students might lead to reading comprehension development, through the mediating effect of decoding skills.

Despite the important role of systematically teaching high-frequency words and phonologically regular words, Solity and Vousden (2009) highlighted the advantages of incorporating real books in the core teaching reading program, providing a different perspective. For them, the more effective method to teach reading is the combination of systematic and direct teaching of core phonological, phonic, and sight vocabulary skills with the use of real books. In addition, real books may develop and extend students' vocabulary and general knowledge. On the other hand, many books written for children incorporate a high degree of repeated words, above and beyond high-frequency words, developing in this way sight word reading skills.

The most significant contribution of the present intervention was its effect on reading comprehension. Based on the post-test results, it appeared that reading fluency instruction had a great impact on students' reading comprehension, since all participants increased their scores. It is well documented that reading fluency instruction has a significant effect on reading comprehension (Chard et al., 2002; Meyer & Felton, 1999; Morgan & Sideridis, 2006; NICHD, 2000). In addition, research has shown that there is a strong correlation between reading fluency and reading comprehension, confirming that skills of reading fluency and comprehension interact highly with each other (Hudson et al., 2009; O'Connor et al., 2007; Padeliadu &

Antoniou, 2013; Schwanenflugel et al., 2009). The way that reading fluency intervention programs cultivate comprehension (Kim et al., 2014; Yang, 2006), highlights the significant role of reading fluency in the transition from serial decoding to text interpretation (Rasinski, 2010). It seems that reading speed progress releases cognitive resources to be used in text interpretation (Katzir et al., 2006). Therefore, it appeared that in more transparent orthographic systems, such as the Greek one, even students with severe reading difficulties are able to develop and cultivate reading skills through a short-term repeated reading fluency program, incorporating evidence-based instructional strategies and controlled texts. However, development of reading fluency per se was observed only in instructional texts, without being generalized to unfamiliar ones.

Specific instructional implications can be drawn based on the analysis of the results of this study: a) repeated reading with self-monitoring and reinforcement can be effective with significant results for students with reading disabilities, b) reading fluency instruction becomes more effective, when it is applied in combination with specially designed instructional texts, c) reading fluency interventions should actively involve students in the reading process, through the use of self-regulation and self-evaluation strategies and d) teaching the irregular text words independently should be incorporated into every reading fluency intervention program. Nevertheless, caution should be given in interpreting the results of the present study. A limitation of the study is the small number of participants. The study results cannot be generalized and also cannot lead to safe and solid conclusions. The design and the method of this intervention should be replicated in a larger-scale study, using experimental and control groups, with an adequate number of participants. Further, future longitudinal studies are needed to be conducted, including systematic and high-frequency sessions.

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