

The Effect of Direct Strategy Instruction through Reciprocal Teaching on the Reading Comprehension and Strategy Use of English Foreign Language Learners with Dyslexia

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Abstract

The purpose of this study was to examine the effect of direct strategy instruction through reciprocal teaching on the reading comprehension and strategy knowledge of three 15 to 17 year old Greek high school students with dyslexia who had been learning English as a foreign language. The three students participated in a programme where four reading comprehension strategies were taught- predicting, questioning, deciphering meaning of unknown words and summarizing. The research method used was an AB single subject design where each participant served as his own control. Each single subject study involved a baseline and a treatment condition. Data were analyzed through parametric statistical analysis by using the linear regression analysis model. The findings from the study indicated that the three students with dyslexia who received direct strategy instruction through reciprocal teaching improved their reading comprehension scores and strategy knowledge in the English Foreign Language.

Keywords: Dyslexia, Reading Comprehension, Strategy Instruction, English Foreign Language Teaching.

1. Introduction

Addressing the reading comprehension difficulties of students with dyslexia who learn English as a foreign language has been a key issue in the English Foreign Language Classroom. It seems that there is a challenge for English Foreign Language teachers to help these students read age appropriate material and keep up with their classmates. Recent research has revealed that proficient readers do not only use their linguistic knowledge in order to read effectively and deal with breakdowns in comprehension but also apply comprehension strategies such as predicting, inferencing and summarizing to adjust and monitor their reading (Lenski & Nierstheimer, 2002). Moreover, good readers do not use comprehension strategies one at a time; rather they orchestrate and coordinate a variety of strategies to comprehend a text (Reutzel, Smith & Fawson, 2005). Students with specific learning differences, however, tend to use fewer strategies and in a less flexible manner both in their first and in the foreign language (Lenski & Nierstheimer, 2002). Thus, a reciprocal teaching intervention program that would develop the reading comprehension of students with dyslexia in a foreign language classroom through direct instruction of multiple strategies could provide a suitable approach for them. Students are taught how to use and coordinate multiple strategies as they read with the ultimate goal of becoming better readers (Reutzel et al, 2005).

1.1 Reading comprehension process

Klingner, Vaughn & Boardman (2007,) define reading comprehension as a multicomponent, highly complex process that involves many interactions between the readers and what they bring to text (previous knowledge, strategy use) as well as variables related to the text itself (interest in the text , understanding of the text types) (p. 8). Thus, according to this definition, reading comprehension requires much more than merely decoding words and mapping graphemes onto phonemes. Irwin (1991) describes five basic comprehension processes that work together simultaneously and complement one another: micro processes, integrative processes, macro processes, elaborative processes and met cognitive processes.

Micro processing refers to the readers' initial chunking of idea units within individual sentences. Integrative Processing involves the connection and inference of relationships between individual meaning units within sentences. Macro processing is the ability to summarize a text by synthesizing and organizing its main ideas. Elaborative processing entails thinking beyond the text. When we read, we tap our prior knowledge and make

inferences beyond points described explicitly in the text. Finally, meta cognition refers to the reader's conscious awareness or control of cognitive processes such as monitoring, understanding and selecting what to remember as well as regulating the strategies which are used while reading.

1.2 Dyslexia and reading comprehension in an English Foreign Language Classroom

Students with dyslexia do not represent a homogeneous group. The exact nature of the specific learning challenges that students with dyslexia face in a foreign language classroom may vary depending on the degree of their learning difficulties as well as the language that is learned (Scheider & Crombie, 2003). Sparks (1995) has proposed the Linguistic Coding Difference Hypothesis which suggests that the native language skills of phonology, syntax and semantics constitute the foundation for learning a foreign language. Thus, failure in any of those areas in the mother tongue will inevitably influence any attempt to learn a foreign language. Dal (2008) points out that the students who struggle with reading in their mother tongue are inclined to experience failure in their attempt to be fluent in a foreign language, as well. Thus, a close interdependence between the ability to read in the mother tongue and a foreign language is suggested. Kahn-Horwitz, Shimron and Sparks (2006) use the notion of "Matthew Effect" according to which readers, who possess strong phonological awareness skills at the initial stages of learning to read, tend to be more effective in foreign language reading acquisition. Students with dyslexia, however, who face particular challenges with decoding skills due to phonological deficits, are at an obvious disadvantage. More specifically, their difficulty in matching the new graphemes to phonemes due to phonological deficits coupled with the irregular English orthographic system poses a major obstacle and places great cognitive demands on beginner readers with dyslexia (Caravolas, Hulme & Snowling, 2001).

However, as students grow older there is a shift of emphasis from lower order skills, such as decoding, to higher order skills where reading comprehension is the goal of the reading process (Williams, 2003). Reading comprehension relies on working memory and semantic processing. To effectively comprehend a text, readers must be able to hold an amount of information in their working memory for a short time while simultaneously processing that information (Swanson & Alexander, 1997). Problems with dyslexic students' working memory hamper the processing of long sentence constructions and, through that, their understanding. In addition to that, EFL students with dyslexia also face an additional challenge since their already hampered working memory has the heavy burden to store systematically an increasing number of new words, word roots, prefixes and suffixes (Scheider & Crombie, 2003).

What is more, students with dyslexia may lack or may not have fully developed their cognitive and metacognitive reading strategies in their first language which influences their ability to transfer those strategies in the foreign language, as well (Kahn-Horwitz et al, 2006); this causes challenges in associating meaning with words (semantics), recognizing and recalling specific details, making inferences or predictions and employing fix-up strategies when breakdowns in communication occur (Bakken, Mastropieri, & Scruggs, 1997).

1.3 Strategy Instruction and Reading Comprehension

Several studies confirm the positive impact of single strategy instruction on readers' comprehension. These studies lend empirical support to the different types of strategies that contribute separately to text comprehension. Alexander and Kulikowich (1991) found that background knowledge is of utmost importance to text comprehension. Dewitz, Carr and Patberg (1987) conducted a research that shed light on the advantages of inference instruction whereas Baumann (1984) advocated about the importance of teaching the strategy of summarizing for better text comprehension. By the same token, based on an analysis of more than 200 published studies from the past two decades, the National Reading Panel (2000) found eight comprehension strategies that were most effective and most promising for instruction. These strategies are: comprehension monitoring, cooperative learning, graphic and semantic organizers, story mapping, question answering, question generation, summarizing, and multiple strategies. In addition to these strategies, the National Reading Panel found varying degrees of scientific research support for several additional strategies, including activating and using prior knowledge, and mental imagery and mnemonics. Researchers such as Palincsar and Brown (1984) and Cummings, Stewart and Block (2005) also suggest that teaching multiple strategies to young learners on a daily basis for at least a month can increase their reading comprehension. Thus, multi-strategy frameworks have been developed which emulate more closely the process of active reading. Reciprocal teaching (Palincsar & Brown, 1984) is one of these research-based instructional procedures that incorporate multiple strategy instruction.

1.4 Reciprocal Teaching

Reciprocal teaching through direct instruction was originally designed to improve reading comprehension for middle school students who demonstrated basic decoding skills but had difficulties in meaning construction and text comprehension (Palinscar and Brown, 1984). The training was designed to scaffold the students by providing an expert model of the use of the following four strategies: prediction, summarization, question generation and clarification.

Since Palinscar and Brown's (1984) initial study, other researchers have also examined reciprocal teaching both in EFL and Special education contexts. Reading intervention programs conducted by Bruce and Robinson (2004), Weedman (2003), Todd and Tracey (2006), and Diehl and Holly (2005) indicated that strategy instruction of multiple strategies such as predicting, summarizing, clarifying unknown words and generating questions affected positively dyslexic students' strategy awareness and led to an improvement in their reading comprehension skills.

Moreover, Duffy and Roehler (1987) and Alfassi (2003) also developed reading comprehension programs that incorporated direct instruction of reading comprehension strategies for at risk students. The teacher began the sessions by explaining and modeling strategies to students. Students then moved on to practice these strategies in real reading situations, monitored by the teacher. The results revealed that the use of reciprocal teaching along with direct explanation of strategies had a positive impact on students' reading comprehension.

Given the need for reading strategy instruction for students with dyslexia and the need for research that documents the best practices for delivering comprehension instruction to them in an English foreign language classroom, a modified version of the original reciprocal teaching was developed in this study. This version includes three key elements that are essential in effective comprehension strategy instruction. The first one is the direct instruction of strategies. The second is the gradual release of responsibility from teacher to students. The third one is the combination of multiple strategies while reading.

2. Methodology

2.1 Purpose of the study

The purpose of this study was to examine the effect of direct strategy instruction through reciprocal teaching on the reading comprehension of three Greek high school students with dyslexia who had been learning English as a foreign language for 6 years. The following questions guide the study.

1. What effect does direct strategy instruction, following the reciprocal teaching framework, have on the reading comprehension competence of three Greek high school dyslexic students who have been learning English as a foreign language?
2. Does an intervention programme based on the direct instruction of the four strategies -predicting, questioning, clarifying the meaning of unknown words and summarizing- through reciprocal teaching improve dyslexic EFL students' use?

2.2 Setting and participants

Three Greek high school students with dyslexia aged 15-17 years old ($M = 15.64$, $SD = 1.15$ years) participated in a single subject design research method. These students were of an Upper intermediate level of English (B2 level according to the Common European Framework, 2001) and were attending an E senior class for 4 hours a week in an evening private language school in Athens. All of them were Greek native speakers who had been learning English as a foreign language for six years. Initially, students who were invited to participate in the study were those who were (a) English foreign language learners of upper intermediate level, (b) with confirmed official diagnoses of dyslexia issued by KEDDY – (The assessments were conducted by Greek official evaluators and revealed the nature of the students' learning difficulties),

(c) and with particular difficulties in reading comprehension. Of the five students who were identified and invited, only 3 returned signed parental consent forms. A formal standardized assessment, the Software for Screening Learning Skills and Difficulties (LAMDA test) (Skaloumbakas & Protopapas, 2007; Protopapas & Skaloumbakas, 2007), was administered to the three students individually.

The LAMDA test is a standardized computer-based assessment and was used in this study as a screening procedure to detect students' weaknesses in the Greek Language in areas such as Decoding, Spelling, Reading Comprehension, Sentence Structure, Vocabulary, Working Memory, Visual Sequence and Figure Completion. The results of the LAMDA test were issued automatically and revealed the nature of the three students' learning weaknesses.

The last stage of the selection process involved the identification of the students' reading comprehension weaknesses in the English Foreign Language through the instrument TORC-3: Test of Reading Comprehension-Third Edition (Brown, Hammil, & Wiederholt, 1995). The TORC-3 test is appropriate for learners between 7 years and 0 months to 17 years and 11 months. It consists of 7 subtests but for the purposes of this study only subtests 2, 3 and 4 which included 70 questions in total were administered to the students.

In the second subtest, 20 questions tested students' ability to identify syntactic similarities between sentences. Students had to read five sentences and circle two sentences that had similar meaning but different syntax. Thus, it addressed learners' lower-level of syntactic parsing (Cronbach alpha .60).

In the third subtest, text comprehension questions aimed to measure students' ability to comprehend English texts for main ideas, details and inferences. It consisted of 6 texts ranging from 30 to 120 words of ascending size and difficulty. The texts were general, story-like and non technical in nature and addressed their higher-level process of situation model of reader interpretation. The students had to read the texts and answer five multiple choice questions which followed the same pattern. The first question required students to select the best title. In Questions 2 and 5, students had to recall story details. In question 3 students had to make inferences from the text. Question 4 required students to make negative inferences (Cronbach alpha .70).

Finally, the fourth subtest consisted of 10 items that checked sentence sequencing. In each item, students had to read five randomly ordered sentences and put them in the correct order so as to construct a meaningful story. Thus, learners had to use their lower level semantic proposition formation by understanding the ideas as well as the syntactic cues conveyed in the sentences so as to construct meaningful paragraphs (Cronbach alpha .632).

2.3 Teaching Materials

Reading Texts

For this intervention programme, the reading texts used for teaching the four strategies were extracted from the books Connect B1 + and Connect B2, Burlington Editions (Anagnostolou & Blair, 2009; McCormick & Anderson, 2010). The texts were expository suitable for the intermediate and upper intermediate students who had been learning English as a foreign language. The reading texts were accompanied by appropriate titles and pictures that would aid the direct strategy instruction process. The length of the texts ranged from 400 to 600 words and the amount of unknown words ranged from 6 to 10 since a larger amount of unknown words would hamper students' reading comprehension and would distract them from concentrating on the strategy practice.

Task Sheets and Prompt Cards

Task sheets and prompt cards were also designed and administered in sessions. These cards and task sheets helped participants write down the strategies they used as well as reflect on the reading comprehension process they followed.

2.4 Assessment Tools

For the assessment of the dyslexic students' reading comprehension and strategy use, 10 reading comprehension tests with multiple choice questions, followed by a strategy awareness questionnaire, were designed. The reading comprehension tests contained expository reading passages ranging from 120 to 160 words. Each text was accompanied by a picture and a title. The students had to read the text and answer 6 multiple choice comprehension questions which followed the same pattern (Cronbach alpha .92).

Question 1: Selecting an appropriate title

Questions 2 and 5: Recalling information from the text

Question 3: Making inferences

Question 4: Making negative inferences

Question 6: Deciphering the meaning of unknown words

The texts were adapted so as no more than 10 unknown words to be present in the texts which could hamper the reading comprehension process of the students.

The strategy awareness questionnaire consisted of 10 multiple choice questions based on the specific strategies which were taught during the direct strategy instruction program. The students were asked to help 'Lisa' who had some trouble comprehending a reading text. They were asked to circle the steps that they think Lisa should take in order to read the text. Questions 1, 2 and 3 tested students' strategy awareness of making predictions based on the title and the accompanying pictures. Questions 4 and 5 required students to show awareness of the questioning strategies that they had learned. Questions 6, 7 and 8 revealed students awareness of applying fix-up strategies for deciphering the meaning of unknown words. Finally, the last two questions checked students' usage of the summarizing strategy. These tests were designed and administered to students at the end of each session (Cronbach alpha = .89). Students were assigned 1 point for each correct answer and 0 for incorrect ones.

2.5 Procedure

The study took place in a resource room of a private language school. The study started at the beginning of January and run till the mid of February 2012. It consisted of 10 sessions for each student and each session was recorded. The sessions were held twice a week and were 60 minutes in length.

The research method that was selected and applied in this study was the single subject design in order to study the behavioral change that the individuals exhibited as a result of the received treatment. Each single subject study involved a baseline and a treatment condition. Each participant served as his own control and his performance was observed and measured repeatedly over the ten sessions. During the first session the students were informed about the process. The next three sessions comprised of the baseline condition where the lessons were conducted in the usual way that the students had been used to. In the pre-reading stage, the teacher used the activities of the book in order to activate dyslexic students' prior schemata and make use of top down processes.

As a while- reading activity students had to read the text and answer the subsequent product oriented comprehension questions. Then, the teacher elicited the correct answers and as a post reading activity she introduced the follow up vocabulary activities. The treatment condition consisted of 6 lessons which followed a reciprocal teaching model (Palinscar and Brown, 1984). The teacher introduced and explained to the students how to use the four reading comprehension strategies -asking questions, summarizing, predicting and identifying unknown words. The instruction of each strategy followed the five major steps as proposed by Peregoy and Boyles (2000).

The preparation stage: During this stage, the teacher raised students' awareness of the importance of each strategy and the reasons for each strategy use in the reading comprehension process.

The presentation stage: Learners received direct instruction on how to use each strategy through a think aloud process.

In the guided practice students applied reading strategies under the teacher's guidance. Specially designed prompt cards were used during this stage that aided students to become more capable of assuming their role in applying the strategies. Throughout this stage, the teacher provided appropriate reinforcement and feedback relevant to strategy use.

In the independence phase the students were given the opportunity to practice the taught strategies on their own. Over the sessions, the five stages were reduced gradually. Eventually, the last sessions consisted of only one stage - the independent stage- where responsibility for strategy use was handed over to the students. At the end of each session, students were provided with a reading comprehension test, followed by a reading comprehension strategy awareness questionnaire.

2.6 Procedural Integrity

In order to prevent any threats to the internal validity of the study, the researcher used the same reading materials and the same activities for each student. Conditions for data collection such as time of day and location were also standardized so as to ensure reliable measurements (McMillan, 2004). The sessions were scheduled on different days so as parameters concerning time to be avoided. Thus, the following schedule was applied (see table 1).

Table1. Scheduled Sessions for the three Students during baseline and intervention phase

Student 1	A Baseline	B intervention
Dates of Lessons	18.1 (Thursday)	28.1 (Saturday)
	21.1 (Saturday)	2.2 (Thursday)
	25.1 (Thursday)	4.2 (Saturday)
		9.2 (Thursday)
		11.2 (Saturday)
		16.2 (Thursday)
Student 2	A Baseline	B intervention
Dates of Lessons	17.1 (Tuesday)	27.1 (Friday)
	20.1(Friday)	31.1 (Tuesday)
	24.1 (Tuesday)	3.2 (Friday)
		7.2 (Tuesday)
		10.2 (Friday)
		14.2 (Tuesday)
Student 3	A Baseline	B intervention
Dates of Lessons	16.1 (Monday)	25.1 (Wednes.)
	18.1(Wednesday.)	30.1 (Monday)
	23. 1(Monday)	1.2 (Wednes.)
		6.2 (Monday)
		8.2 (Wednesd.)
		13.2 (Monday)

A refers to the baseline (period before the treatment) and **B** to the intervention programme (the treatment period).

To ensure that the intervention was implemented with fidelity and that all students received the same materials and the same instructions for each session, a Teacher Journal Checklist was designed and completed by the teacher on each session of the baseline and intervention phase. The Teacher Journal provided a structured lesson plan and a specific time frame for each activity. It also served as a continuous process for teacher observation. The Teacher Journal Checklist consisted of 3 procedural Phases. During the Before Classroom Observation Phase (1st Phase) the teacher had to specify the date and time, the name of the student, the session and the materials used. The Classroom observation Phase (2nd Phase) consisted of three stages (pre- reading stage, while- reading stage and post-reading stage) during which the strategies were taught in the following sequence -Explanation, Think aloud process, Teacher guidance and Independent Work. The teacher checked off each step that was completed on the Teacher Journal checklist as well as the procedure completion time. In the third Phase of the Teacher Journal Checklist, the teacher specified any problems that were encountered during the sessions. Each session was audio recorded. Later, a trained second observer teacher not familiar with the research question compared the researcher-marker observer copy to the audio-recording. Interobserver agreement was calculated by dividing the number of agreements by disagreements and multiplying by 100. The results from the procedural integrity checklist yielded data that indicated the teacher completed all of the steps (20 steps in total) with 100% accuracy for all phases of the experiment.

2.7 Social Validity

After the implementation of the program, the trained second observer was asked to complete a program's estimation questionnaire about her overall impression of the reading strategy instruction program. This ensured the social validity of the research. The trained observer teacher had to answer "Yes", "Almost" or "No" to the questions that fell under three major categories "Acceptance", "Efficiency" and "Intention". In the "acceptance" part, the observer had to answer 8 questions in terms of whether she liked the program or if she would use direct strategy instruction in the future. The category "efficiency" comprised of 8 questions that checked whether students were able to apply the taught strategies during the intervention program. Finally, the 8 questions that fell under the "intention" category revealed the teacher's intentions of using the strategy instruction program with other students or of applying it in next semester's lessons. Generally speaking, the teacher's impression of the program was favorable.

An evaluation of the data collected, which range from 1.0 to 3.0, revealed that the teacher liked the program ($M=2.47$, $SD=.33$) and that she thought that it was effective ($M=2.58$, $SD=.52$). Finally, the teacher was also willing to implement its components in her lessons in the future ($M=3.00$, $SD=.00$). Upon completion of the study the three students were also asked to complete a social validity form to evaluate the acceptability of the intervention. A modified version of The Children's Intervention Rating Profile (CIRP), a 7-item measure, was used to evaluate child perceptions of acceptability. This scale was translated into the Greek Language to facilitate students' comprehension. Mean item ratings for the Children's Intervention Rating Profile, which range from 1.0 to 5.0, were high for students' overall impression ($M = 4.48$, $SD = 0.62$) and acceptance of the programme ($M = 4.47$, $SD = 0.56$).

2.8 Experimental Design

This study utilized an AB single subject design (AB), a form of a single case design (SCD) to investigate the effect of reciprocal teaching on reading comprehension and strategy awareness of three students with dyslexia. An AB single subject design was chosen for this study as it is a research method that rigorously provides evidence about the effectiveness of an intervention using a relatively small sample size and because each participant serves as his own control (Wolery et al, 2011 p.103). Moreover, this design provides objective data regarding the effects of an intervention when time and resources are limited (Kazdin, 2003). Data was collected for each participant during two phases: Baseline (A) and Intervention (B). In the baseline phase, the target behavior (reading comprehension and strategy use) was observed and data was collected without the implementation of the specific intervention. The baseline behavior provided the frame of reference against which future behavior was compared. In the intervention phase, the researcher introduced direct strategy instruction and collected data on the target behavior.

2.9 Data Analysis

The results of this study were analyzed through visual parametric statistical analysis. Although the visual inspection method has historically been the traditional way to assess the effects of an intervention in single-subject research (Busk & Serlin, 1992; Parsonson & Baer, 1978), the results of previous studies (Le Fevre, Moore, & Wilkinson, 2003) have shown variability in the data, making it difficult to interpret the results using only visual inspection. Therefore, a linear regression analysis was conducted to identify and summarize the effect that reciprocal teaching had on reading comprehension and strategy awareness.

More specifically, results of this study were analysed by using the linear regression analysis model $Y=a+ bx$. The linear regression model describes the dependent variable with a straight line that is defined by the equation $Y = a + bx$, where Y is the value of the dependent variable, a is the y-intersect of the line, b is the slope of the regression line or as it is called "the regression coefficient" and x is the value of the independent variable. Initially, predictive slopes were estimated per phase (i.e., separately for baseline and the intervention conditions for each student individually). These slopes were estimated with the dependent variable being "reading" or "strategy knowledge" and the independent variable being "time". The parameters a and b of the regression line were estimated from the values of the dependent variable Y and the independent variable x with the aid of statistical methods (SPSS). Then the slopes were compared with each other using linear regression t tests in order to determine the statistical significance. The p -values were compared to the significance level $\text{Alpha}=0.05$. If the $p\text{-value} \leq \alpha$, then the correlation was thought to be statistically significant and the correlation different from 0. Finally, in order to estimate the strength of the relationship between two variables, the correlation coefficient (r) was calculated. The closer the correlation coefficient was to 1 or -1 , the stronger the relationship.

3. Results

As far as the first student is concerned correlation between reading comprehension scores and time at baseline was negative and equal to $R= -0,866$ and the predicted slope was $Y= 3,66x + (-0,5)$. The respective correlation during intervention was positive and equal to $0,612$ and the predicted slope equal to $1,73x + 0,6$ (Figure 1). When comparing the two predicted slopes results indicated significant differences due to condition ($t= 2,27$, $p= 0,025$) (Figure 3) (Table 2). In terms of strategy knowledge and time, the correlation at baseline was $R=.866$ and during intervention $R= .960$ The predicted slope during baseline was $Y=1,33+ 0,5$. The respective correlation during intervention was $0,960$ and the predicted slope was equal to $Y=1,2x+1,51$ (Figure2).

Comparing the two predicted slopes indicated significant differences between them ($t= 2,78$ and $p=0,0066$) (Figure 3)(Table 2).

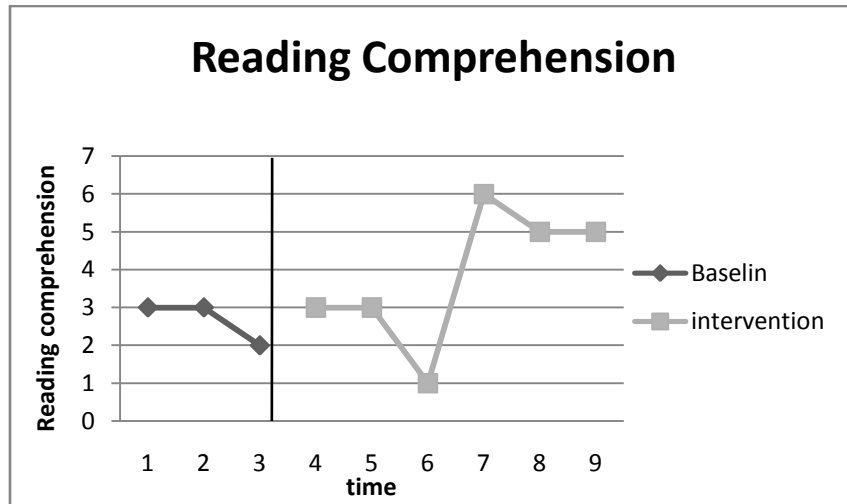


Fig. 1 Reading comprehension scores of First Student during Baseline and Intervention phase

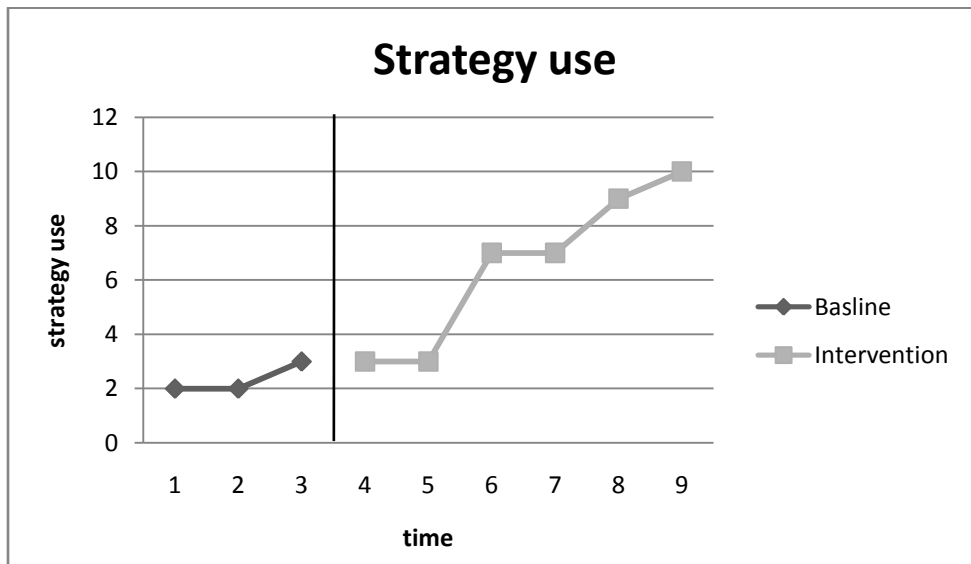


Fig. 2 Strategy knowledge scores of First Student during Baseline and Intervention phase

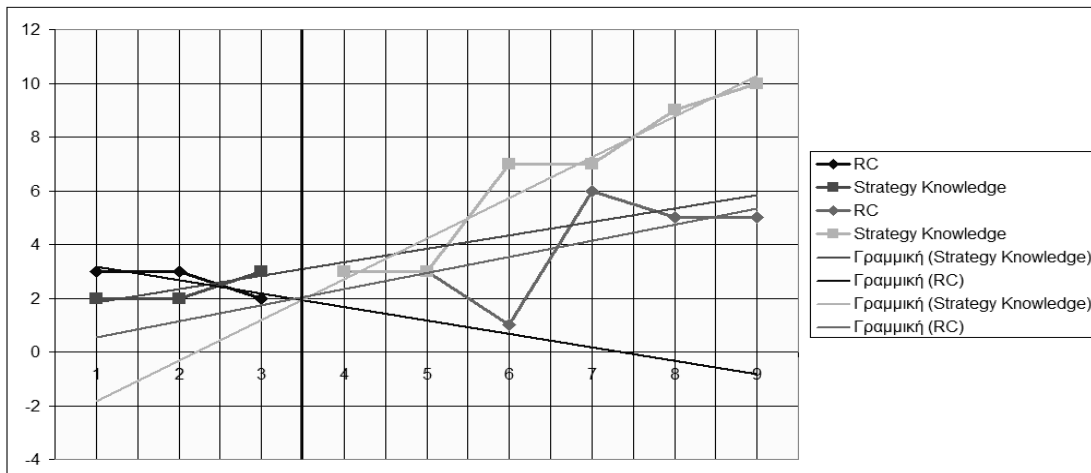


Fig. 3 Predictive slopes for reading comprehension and strategy knowledge of First Student during Baseline and Intervention phase

Table 2 Comparison of the two predicted slopes of regression analysis for the three students for reading comprehension and strategy knowledge

	b1	b2	se1	se2	se1*se1	se2*se2	se1+se2	t denom	t numer	t	p
Rc1	0.6	-0.5	0.388	0.289	0.1505	0.08352	0.234065	0.483803	1.1	2.273654	0.02539
Rc2	0.6	-0.5	0.388	0.1	0.1505	0.01	0.160544	0.400679	1.1	2.745337	0.00731
Rc3	0.63	-0.99	0.25	0.01	0.0625	0.0001	0.0626	0.2502	1.62	6.474822	0.00000
Str1	1.51	0.5	0.22	0.289	0.0484	0.083521	0.131921	0.363209	1.01	2.7807	0.00661
Str2	1.15	0	0.27	0	0.0729	0	0.0729	0.27	1.15	4.259259	0.00051
Str3	1.71	-0.5	0.29	0.289	0.0841	0.083521	0.16761	0.409415	2.21	5.39794	0.00001

b1 first regression coefficient, b2 second regression coefficient, se1 standard deviation of b1, se2 standard deviation of b2 , tnumer numerator degrees of freedom, tdenom= denominator degrees of freedom, RC reading comprehension, Str strategy knowledge.

With regard to the second student’s reading comprehension the correlation between reading scores and time at baseline was equal to $R = 0,866$ and the slope was equal to $Y=3.33x+(-0.5)$. The respective correlation during the intervention was $0,924$ and the slope equal to $Y=2.13x+0.46$. When comparing the two predicted slopes results indicated significant differences due to condition ($t=2,75$, $p = 0,007$). It is concluded that reading comprehension scores were associated with a positive trajectory and that trajectory was significantly different compared to the respective one in the baseline condition (Figure 4). The results on reading comprehension were replicated for strategy use. The slope at baseline was flat (equal to zero) and positive during the intervention condition (Figure 5). Their difference exceeded conventional levels of significance ($t=4,259$, $p < 0,001$) (Figure 6).

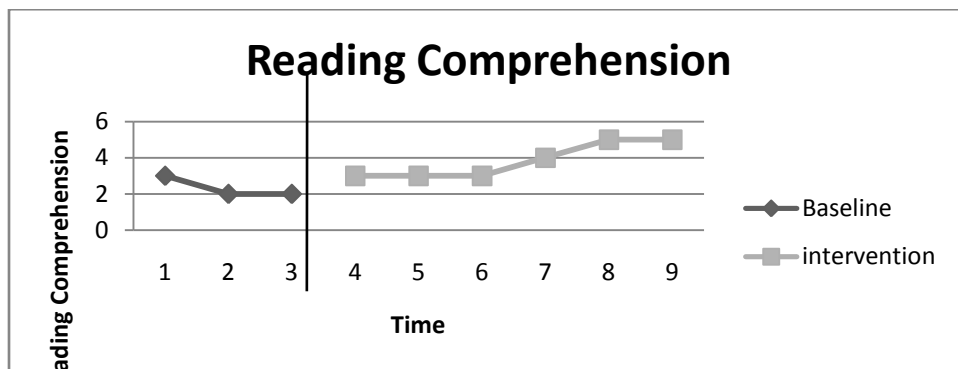


Fig. 4 Reading comprehension scores of Second Student during Baseline and Intervention phase

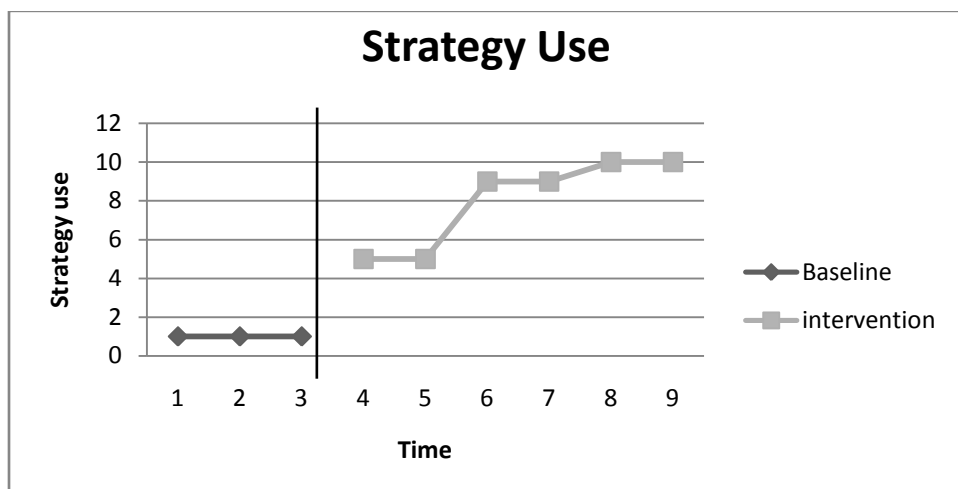


Fig. 5 Strategy knowledge scores of Second Student during Baseline and Intervention phase

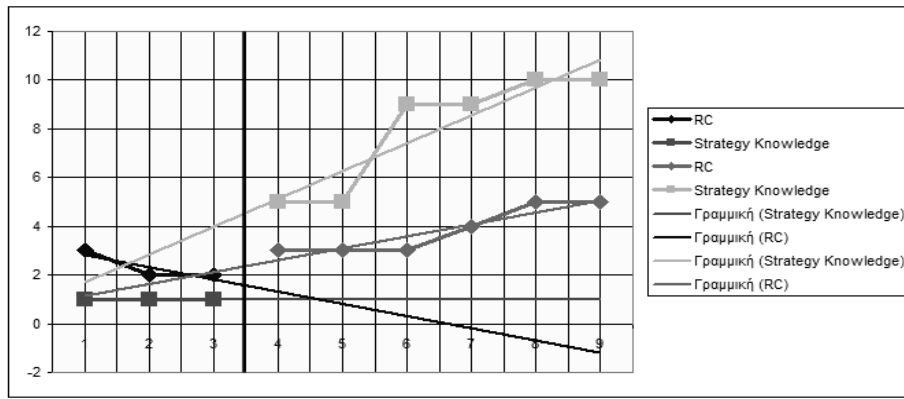


Fig. 6 Predictive slopes for reading comprehension and strategy knowledge of Second Student during Baseline and Intervention phase

In terms of the third student’s *reading comprehension*, the correlation between reading scores and time at baseline was $R=1,00$. The slope was equal to $Y=1x+1$. The respective correlation in the intervention phase was $R= 0,781$ and the slope was equal to $Y= 1.13x + 0,63$ (Figure 7). When comparing the two predicted slopes results indicated significant differences due to condition ($t=6,47$ and $p=0.01$). Thus, if the two predicted trajectories are compared there is an upward shift in level and an upward change in trend (Figure 8). As far as *strategy use* is concerned, the correlation between strategy use and time at baseline was $R= -866$. The slope was equal to $Y=2,66x + (-0.5)$. The respective correlation during the intervention phase was $0,947$ and the slope was $Y= 0,66+ 1,71$ with significant differences due to condition $t=5,39$ and $p=0,0001$ (see figure 9).

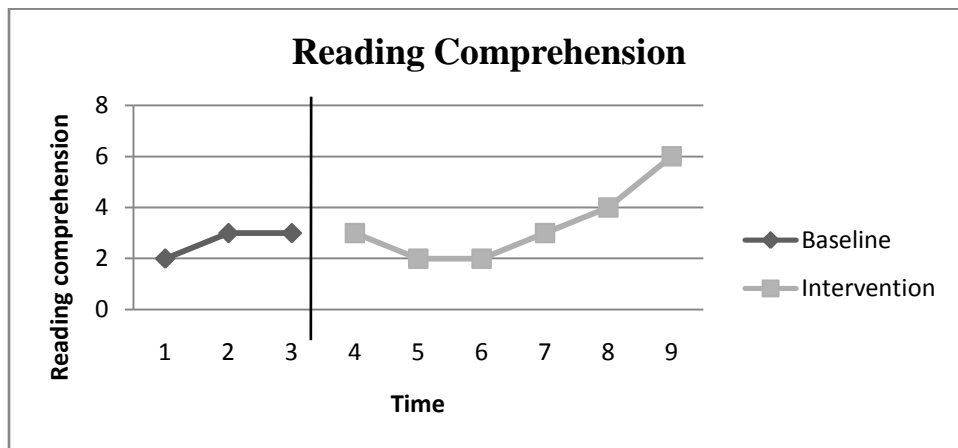


Fig. 7 Reading comprehension scores of Third Student during Baseline and Intervention phase

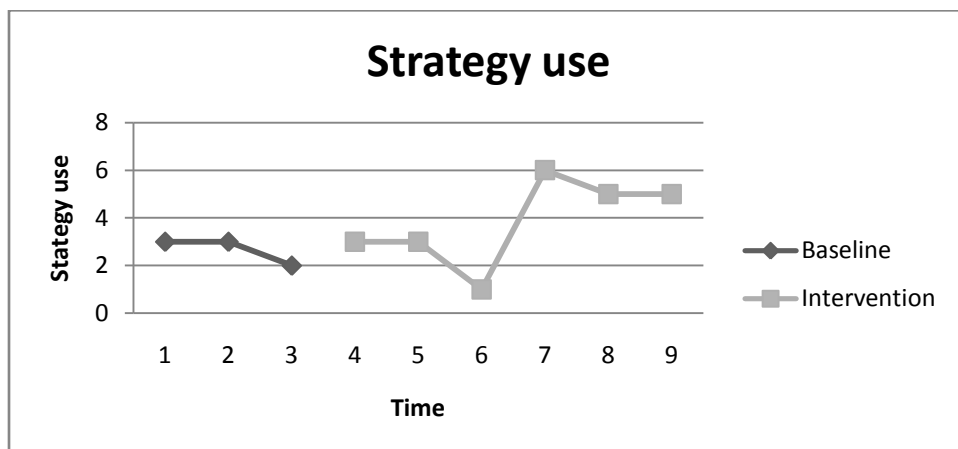


Fig. 8 Strategy knowledge scores of Third Student during Baseline and Intervention phase

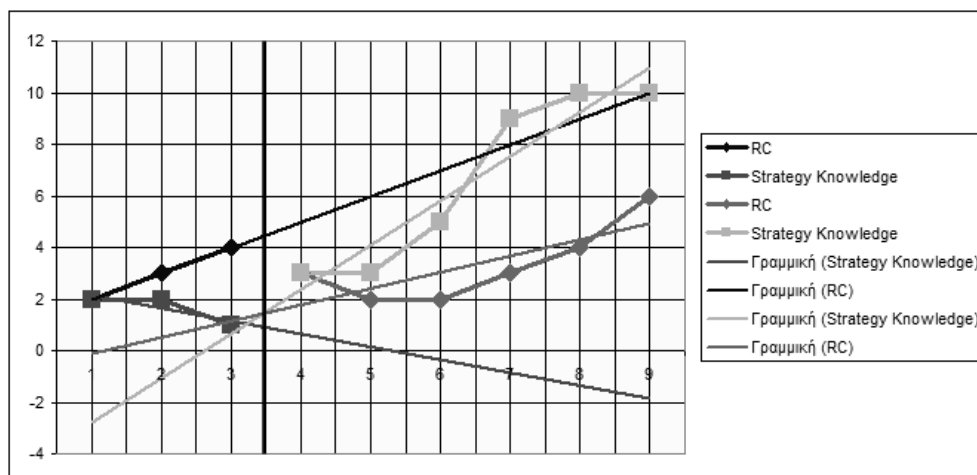


Fig. 9 Predictive slopes for reading comprehension and strategy knowledge of Third Student during Baseline and Intervention phase

4. Discussion

The purpose of this study was to investigate the effects of direct strategy instruction through reciprocal teaching on three Greek high school dyslexic students who had been learning English as a foreign language for six years. Comparing the results, a number of assumptions can be drawn. It is evident that the three dyslexic students who received direct strategy instruction improved in both reading comprehension competence and strategy knowledge over a limited period of two months.

Analysis of the results revealed that during the baseline phase all of the students just read the reading texts and then answered the reading comprehension questions that followed. Thus, the notion of perfect comprehension was reinforced whereas the multiplicity of meanings and interpretations of a text were undermined (Calfoglou, 2004). This did not provide the dyslexic students with the opportunity to develop sufficient higher order strategies that would help them understand a reading text or to deal with break downs in communication. During the intervention phase, the three students were taught four strategies- prediction, generating questions, deciphering the meaning of unknown words and summarizing- through direct instruction of reciprocal teaching. The strategy instruction helped them to surpass difficulties that they faced, leading to better comprehension scores. During the baseline phase, the first and the second student scored three correct answers in the reading comprehension tests whereas the third student only two. However, after the intervention phase their correct answers increased for all them. What needs to be pointed out here is that the third student's reading comprehension improvement was not as remarkable as the first two. This may be due to the fact that it took him some time to familiarize himself with the new way of dealing with reading comprehension texts. He preferred to stick to his own way of reading a text - simply reading it, translating it and answering the reading comprehension questions that followed- because he thought that it was less time consuming. The findings of the present study are in accordance with studies carried out both in the field of special education and EFL (Palincsar and Brown, 1984, Wisajorn ,2003). Fung, Wilkinson and Moore (2003) and Le Fevre and Wilkinson (2003), who used a single subject research design, found a steady increase in students' reading comprehension when direct strategy instruction was applied. Hattie (2009) and Sporer, Brunstein and Kieschke, (2009) also stated that students who were taught a repertoire of strategies through reciprocal teaching attained higher scores on reading comprehension tasks contrary to those students who received a traditional instruction. Finally, Purcell- Gates, Duke and Martinaeu's study (2007) also revealed similar results. Students who simply read texts and answered reading comprehension tasks at the end, showed low rates of comprehension growth. On the contrary, students who were taught how to form their own questions were more involved in the construction of meaning and had better reading comprehension scores.

In terms of strategy use, the results revealed that initially the students were not aware of different kinds of reading strategies or how to use them. The first and third student scored only two correct answers in the strategy awareness questionnaire whereas the second student only one. However, during the last sessions their responses to questionnaires revealed knowledge of a wider repertoire of reading strategies.

These findings go in line with Manset-Williamson and Nelson's findings (2005) suggesting that dyslexic students, in contrast to good readers, are not fully aware of reading strategies; they are less able to identify main ideas, decode unfamiliar words or summarize main ideas and for this reason direct strategy instruction and practice is necessary.

Finally, the strategies were instructed in a step by step fashion. First, the teacher explained the usefulness of strategy use, followed by modeling, practice, and independent stage. Thus, the students had enough practice before working on their own. This process helped them understand the rationale behind the four strategies. (Moloch, 2002). This gradual release of responsibility, however, involved certain complexities which needed to be addressed by the teacher. During the eighth session, the students' performance was reduced. This may have occurred due to the fact that at that lesson the students were asked to work on their own with minimal assistance from the teacher for the first time. Dyslexic students, however, do not have the ability to self regulate themselves and this may have increased their anxiety levels (Zimmerman, 2000).

5 Conclusion and Future Implications

The aim of this study was to explore the effectiveness of direct strategy instruction through reciprocal teaching on three Greek dyslexics' reading comprehension and strategy awareness in an English foreign language classroom. The study revealed that, after receiving direct strategy instruction through reciprocal teaching, students employed reading strategies more readily and there was an improvement in the three dyslexic students' reading comprehension scores.

Although effort was made to ensure triangulation of data and to provide strong evidence of treatment effects, certain limitations must be considered when interpreting the results. The study lasted for approximately two months which is a relatively short period to reveal any long lasting effects of behavioral change (Kazdin, 2003). Moreover, this study was restricted to Greek high school dyslexic students who had been learning English as a foreign language for 6 years. Thus, the findings cannot be generalized to different teaching contexts. Yet, the findings of the present study go in line with a great body of literature suggesting that reciprocal teaching intervention seems to yield positive outcomes on students with specific learning difficulties.

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