

A SUPPLEMENTAL COMPUTER-ASSISTED INTERVENTION TO PREVENT EARLY READING DIFFICULTIES IN SPANISH LEARNERS: A RANDOMISED CONTROLLED TRIAL

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Introduction

It is possible to prevent early decoding difficulties in most of the students with phonological deficit (Torgesen, 2009; Snowling, 2012a). Difficulties implementing effective instruction for at-risk students arise from two challenges: evidence-based knowledge transfer and lack of economic resources.

Computer-assisted programs can offer a suitable solution, providing quality instruction with low cost resources (Torgersen and Barker, 1995; Olson, Wise, Ring and Johnson, 1997). There are a group of studies on early intervention in children with reading delay which have achieved promising results (Macaruso, Hook, & McCabe, 2006; Magnan, & Ecalle, 2006; Regtvoort, & van der Leij, 2007; Saine, Lerkkanen, Ahonen, Tolvanen, & Lytinen, 2011).

Another strategy to optimize resources is to develop interventions that produce major benefit in the shortest period of time. Case et al. (2010) conducted a review about short supplemental interventions for first graders. They concluded that supplemental intervention benefits children with learning reading difficulties, when compared to the typical classroom instruction or even to an instruction improved class (Allor and McCathren., 2004; Berninger et al, 2000; Fuchs et al, 2008;. Hatcher et al., 2006; McMaster et al., 2005; Ryder et al, 2008).

Objective

This study aims to design and test an intervention with three characteristics:

- A supplemental activity.
- Training decoding is based on the syllable (*Binding Method* by Sopena et al; <http://www.binding-edu.org/>).
- A short-term intervention

Method

32 children (grade 1) with learning difficulties were identified and paired on at least three pretest reading measures (reading efficiency of monosyllabic and disyllabic items, words, pseudowords, and texts speed; see Table 2).

Each pair was assigned to two different intervention programs: a computer-assisted instructional program (**CAIP**) focused on developing phonological route versus to the Spanish Public School Assistance Services (**PSAS**).

Computer-assisted instruction consisted of four individual 12-15 minute sessions per week focused on syllable decoding plus a collective comprehension session per week of 1 hour. CAIP was delivered by university students. The assistance services typically consisted of one hour per week, individually or in small groups, delivered by trained teachers. Both programs were applied for 11 weeks.

Results

Table 1. Differences between CAIP and PSAS conditions on posttest

Test	PSAS	CAIP	t	Difference	SD	Effect Size
Letters	35,33	37,51	0,28	-2,18	10,48	-0,21
Monosyllables Reading	45,52	55,38	0,014**	-9,86	12,96	-0,76
Disyllables Reading	24,31	30,60	0,041**	-6,29	10,25	-0,61
Words Reading	32,60	39,08	0,056*	-6,48	11,52	-0,56
Pseudowords Reading	28,26	32,5	0,083*	-4,21	8,53	-0,49
Text Reading Speed	48,49	60,69	0,068*	-12,19	23,02	-0,53
Oral Comprehension	15,38	16,13	0,32	-0,75	4,44	-0,17
Reading Comprehension:						
• Previous Knowledge	3,13	3,69	0,04**	-0,57	0,91	-0,62
• Ideas Memory	1,75	2,75	0,01**	-1	1,27	-0,79
• Inferences	1	1,86	0,01**	-0,86	1,1	-0,79
• Integration	2,38	3,13	0,096*	-0,75	1,6	-0,47
• Total	8,25	11,48	0,006**	-3,19	3,69	-0,86

Table 2. Treatment resisters in both conditions

Subjects	Pretest					Posttest					Treatment resistance	Reading comprehension
	Monosyllables	Disyllables	Words	Pseudowords	Text Speed	Monosyllables	Disyllables	Words	Pseudowords	Text Speed		
1	-	-	-	-	-	-	-	-	-	-	0	-
2	-	-	-	-	-	-	-	-	-	-	0	-
3	-	-	-	-	-	-	-	-	-	-	0	-
4	-	-	-	+	-	+	+	+	+	+	1	-
5	-	-	-	-	-	+	+	+	+	+	1	+
6	-	-	-	-	-	+	+	+	+	+	1	-
7	-	-	-	-	-	-	-	-	-	-	0	-
8	+	+	-	-	-	+	+	-	-	-	0	+
9	+	-	-	-	-	+	+	+	+	+	1	-
10	-	+	-	-	-	+	-	-	-	-	0	-
11	-	-	-	-	-	+	+	+	+	+	1	+
12	-	-	-	-	-	+	+	+	+	+	1	-
13	-	-	-	-	-	-	-	-	-	-	0	+
14	-	-	-	-	-	-	-	-	-	-	0	-
15	-	-	-	-	-	+	+	-	-	-	0	+
16	+	-	-	-	-	+	+	+	+	+	1	-
17	-	-	-	-	-	-	-	+	+	+	1	+
18	+	-	-	+	-	-	-	-	-	-	0	-
19	-	-	-	-	-	+	-	-	-	-	0	-
20	+	+	-	-	-	+	+	+	+	+	1	+
21	-	-	-	-	-	+	+	+	+	+	1	+
22	-	-	-	-	-	+	+	+	+	+	1	+
23	-	+	-	-	-	+	+	+	+	-	1	+
24	+	+	-	-	-	+	+	+	+	+	1	+
25	-	-	-	-	-	+	-	-	+	-	0	+
26	-	-	-	-	-	+	+	+	-	-	1	+
27	-	-	-	-	-	+	+	+	+	+	1	+
28	-	-	-	-	-	-	+	+	+	+	1	+
29	-	-	-	-	-	-	-	-	-	-	0	+
30	-	-	-	-	-	+	+	+	+	+	1	+
31	-	-	-	-	-	+	+	+	+	+	1	+
32	-	-	-	-	+	-	-	-	-	-	0	+

DECODING SKILLS

- CAIP is significantly or marginal higher than PSAS in all measures.
- CAIP has a medium or large impact on decoding skills compared to the PSAP program.
- The impact of CAIP condition is 25 percentage points higher than the PSAS condition.
- While CAIP produces a progress that exceeds the 30th percentile in 68.75% of the students, the PSAS condition reaches only progress in student 43.75.

TRANSFERENCE TO COMPREHENSION SKILLS

- Special mention deserves the impact of CAIP condition on measures of comprehension. CAIP condition was significantly higher than the PSAS condition, reaching large size effects.

PROGRESS AND COMPREHENSION SKILLS

- 7/16 PSAS students progressed in decoding skills above the 30th percentile, however, only two of these students showed reading comprehension scores above the 30th percentile.
- CAIP. 11/16 students progressed in decoding skills and they were up to 14 those moving above the 30th percentile in reading comprehension test.
- In short, both conditions showed an equivalent oral understanding in pretest and posttest, however, in the posttest, only 31.25% of the PSAS condition progressed on reading comprehension, while the CAIP's one reached 87.5%.