Review
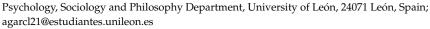
Efficacy of the RtI Model in the Treatment of Reading Learning Disabilities

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Abstract: (1) Background: The response to intervention (RtI) model makes possible the early detection of reading problems and early intervention for students at risk. The purpose of this study is to analyze the effective measures that identify struggling readers and the most effective practices of the RtI model in reading in Primary Education. (2) Method: A systematic review of the literature published between 2010 and 2020 was performed, analyzing in the 31 selected articles, the identification and monitoring methods and the interventions at the different tiers of the RtI model. (3) Results: There are different methods to identify struggling readers, and there is no consensus on the matter. There are also many differences in the implementation of the different tiers of the RtI model; however, its effectiveness is demonstrated. (4) Conclusions: The implementation of the RtI model in a flexible way adapted to the circumstances of each moment, and can be considered as a highly effective resource in the prevention and early detection of reading learning problems.

Keywords: reading learning disabilities; response to intervention model; early detection; early intervention; systematic review

1. Introduction

Reading is a fundamental skill for academic and personal spheres. It is a very complex skill, meaning that students sometimes have problems in acquiring it. Reading learning disabilities are one of the most prevalent learning disabilities, affecting about 80% of those who are detected to have a learning disability [1]. This prevalence varies and depends on factors such as the identification process, age, language and culture of the subjects, and the diagnostic criteria, among other factors [2]. Prevalence is higher in countries where spelling is opaque (English-speaking countries), compared to other, more transparent, languages (Spanish-speaking countries) [2,3]. However, reports on the prevalence of this type of difficulty in the literature vary; in the United States, estimates of prevalence for school-age children range between 5 and 17%, while in the United Kingdom, they range from 3–6%.

Over recent years, guidance has changed in relation to the scientific field of specific learning difficulties, which has had direct consequences on their identification and treatment [4,5]. Up to now, the IQ-achievement discrepancy model has generally been used to identify those students who present learning disabilities, based on comparing the student's academic achievement with their learning potential [4,5]. However, this model, which involves waiting for the student to fail, has been questioned by educators and researchers as a method for defining and identifying students with learning disabilities [6]. Empirical models have raised questions about validity, with limitations and a high percentage of error, leading to controversy and ultimately to those models being rejected [5,7] and replaced.

The alternative model is based on response to intervention (RtI model), whose core components are high-quality classroom instruction, universal assessment, continuous monitoring of progress, research-based interventions, and fidelity of educational interventions [8]. These models present a general framework that allow various methods of implementation, although they differ in the number of tiers of support [9]. The peculiarity

of this model is that the more severe the students' needs, the greater the intensity of the intervention [9,10].

The foundation of this model is that students exhibiting a weak response to an instruction, derived from empirical evidence, may present learning disabilities and need intervention [11]. According to authors such as Jiménez [12], the tiers of intervention are as follows:

- Tier 1: Evidence-based, generalized, preventive, proactive instruction for all students in a class. The instruction is given within the timetable for the subject, and it is here where possible students who are at risk of presenting difficulties are detected [13,14]. Monitoring progress is just as important as identification, which is why it must be dynamic and be able to measure possible changes in student performance [15], therefore all students are evaluated at three time points throughout the academic year: at the beginning, in the middle, and at the end [14].

- Tier 2: A more focused intervention aimed at achieving objectives based on the student's needs. It is taught in small homogeneous groups (three to six students) and is aimed at at-risk students who had an inadequate response to Tier 1 [16]. In the earliest educational years, this intervention is preventive in nature and the objective is to identify students at risk of presenting difficulties, consisting of a relatively brief intervention that allows students to be directed towards achievement [17]. These are typically 40-min daily sessions and progress is monitored once a month [18,19].

- Tier 3: Based on individualized, more intensive intervention, given individually or in very small homogeneous groups (one to three students). At this tier, 60-min daily sessions and weekly monitoring are advocated with previously set objectives [14].

This structuring of the model in three tiers is not radical, so that the researchers adapt it according to their convenience [19].

In addition, following the formation of the National Reading Panel, it was felt that the teaching of reading in this model should include instruction of the Five Big Ideas, defined below [12]:

- Phonological awareness: this skill involves learning to manipulate sounds [20] so that instruction provides a basic foundation for learning to read in different alphabetic languages [21].

- Phonetics: understanding the relationship and the rules of grapheme-phoneme conversion is a prerequisite for correct identification of words [20].

- Fluency: this important ability to read quickly and accurately, with context-appropriate intonation is sometimes a forgotten component in reading instruction [22,23].

- Vocabulary: instruction focused on word recognition and understanding what words mean from their use is very important for school success and reading comprehension. When a student has a rich knowledge of vocabulary, they meet one of the main objectives of the first few years of education [24].

- Comprehension: the ability to understand the meaning of a text, includes different cognitive processes, such as inferences and connections with previous knowledge [18]. For this reason, prevention is a very important factor in dealing with learning disabilities, because there is a high chance of success in cases identified at the beginning [25].

The aim of this study was to perform a systematic review of empirical studies based on the RtI model in reading in Primary Education in order firstly to analyze what assessment measures are used to identify students with reading learning disabilities and secondly, to identify the most effective practices at different levels of intervention.

2. Method

2.1. Bibliographic Search and Selection Procedure

The bibliographic search was carried out using Google Scholar, Scopus, Web of Science, and Wiley Online Library as databases. The following terms were used: "Response to Intervention", "Elementary School", "Learning Disabilities", "Learning Difficulties",

"Learning Disorders", "Reading", and "Literacy". To review the search results, the title and the abstract (objective and method if it was an empirical paper) were read.

From all the documents consulted, only empirical papers with access to the full text were used. All the examined articles were published within the previous decade, between 2010 and 2020, and worked with samples of students from Kindergarten to Primary Education. In addition, for a document to be considered valid for this study, it had to work on some aspect related to reading, include a description of the intervention carried out, at what tier or tiers it was delivered, and the evaluation measures both to identify and classify participants, as well as to identify changes after the intervention.

Of the 292 documents initially identified, 106 duplicates were found, leaving a sample of 188 papers. On examining both the title and the abstract of all the documents, 157 papers that did not meet the inclusion criteria above were discarded. Ultimately, according to the criteria, 31 articles were included. Of these 31 documents, four belonged to Scopus database, 19 from the Web of Science, seven from the Wiley Online Library, and the remaining article was from an indirect search.

2.2. Analysis Procedure

A detailed reading of the 31 resulting documents was made, gathering information about the sample, the work area, the way of identifying and selecting the participants, the variables evaluated, and the description of the intervention.

3. Results

The results are presented below. They include the assessment measures of the RtI model, including both the identification and the monitoring methods and also the most effective practices at different tiers of that model.

3.1. Assessment Measures

3.1.1. Identification

Three different methods have been used to identify and select the students: tutors' expert judgment, diagnostic reports, and specific tests, which were the most commonly used, where participants must score below or above a set percentile to be part of the group receiving intervention. This criterion varied according to the test or the study, as with the Woodcock-Johnson Test [26–28] and the Test of Word Reading Efficiency [29,30] (Table 1). There were some studies where several of these methods were combined for more accurate selection such as Al Otaiba [29,31] and Pericola [32], combining expert judgement from the tutor and a specific test.

Table 1. Methods of identification of participants.

Method of Identification	Selection Criteria		Studies	
Diagnostic report	Clinical diagnosis of some type of learning disability demonstrated by evaluations		[33] Romeo et al.; [34] Chambers et al.; [35] Ritchey et al.; [36] Tilanus et al.	
Expert judgement of the tutor	Selection of classroom students who present more difficulties		[29] Al Otaiba et al.; [31] Al Otaiba et al.; [32] Pericola et al.; [37] Bouton et al.; [38] Castejón et al.; [39] Cho et al.; [40] Georgiou et al.; [41] Svensson et al.	
Specific Test			**Evaluated Variable**	
AIMSweb	Score below the 40th percentile (subtest *Letter Sound Fluency*)		Letter sound fluency	[29] Al Otaiba et al.; [31] Al Otaiba et al.
CBM-R [1]	Standard score below 100 words read per minute in three passages		Oral reading	[42] Van Norman et al.
CTOPP [2]	- Score of "low performance". - Score below the 25th percentile in three of five phonological processes		Reading speed and accuracy and phonemic awareness Core reading subskills	[39] Cho et al. [33] Romeo et al.
DIBELS [3]	- Score "at risk" or "some risk" - Reading less than seven words in *Oral Reading Fluency*		Reading in both studies	[33] Romeo et al. [43] O'Connor et al.
DRA [4]	Score of 1, 2 or 3		Reading	[32] Pericola et al.
GMRT [5]	Score of 85 or lower		Reading achievement	[28] Miciak et al.; [44] Cho et al.; [45] Vaughn et al.
KBIT [6]	Score in or above the 16th percentile		Nonverbal cognition	[33] Romeo et al.
MAP [7]	Score below the 25th percentile		Academic achievement	[18] Jennings et al.
Not specified	Score in the 50th percentile for reading accuracy and score below the 30th percentile in word reading speed with different levels of phonological and spelling complexity		Reading speed and accuracy	[46] Ferroni et al.
RAN/RAS [8]	Score below the 25th percentile		Rapid automatized naming	[33] Romeo et al.
The Hong Kong Specific Learning Difficulties Behavior Checklist	Score above the 75th percentile		Reading	[47] Jiménez et al.

Table 1. *Cont.*

Method of Identification	Selection Criteria	Studies	
TOWRE [9]	• Score below the 40th percentile in the *Sight Word Efficiency* and *Phoneme Decoding Efficiency* subtests • Reading fewer than 10 words • Score of 90 or less than 90	Identification of words and decoding. Word reading fluency. Word reading fluency	[29] Al Otaiba et al.; [31] Al Otaiba et al. [26] Denton et al. [30] Denton et al.
WASI [10]	• Score less than 70 • The *Matrix Reasoning* and *Vocabulary* subtest	Intelligence in both studies	[37] Bouton et al. [40] Georgiou et al.
WIF [11]	Subprime lowest score	Word identification fluency	[32] Pericola et al.
WJ [12]	• Score below the 30th percentile in *Basic Reading Skills Cluster* • Score below the 25th percentile in the *Basic Reading Skills Cluster* • Score greater than 95 in *Word Identification* and *Passage Comprehension* • Score equal to or less than 86 in the *Passage Comprehension* subtest	Letter identification and decoding Letter identification and decoding Letter identification and comprehension Comprehension	[26] Denton et al.; [30] Denton et al. [27] Greulich et al. [48] Kim et al. [28] Miciak et al.
WRAT [13]	Score less than 90 in word reading	Reading and comprehension	[40] Georgiou et al.
YARC [14]	Lower scores in *Early Word Reading* and *Single Word Reading*	Reading and comprehension	[49] Duff et al.

[1]: Curriculum-Based Measurement of oral reading; [2]: Comprehensive Test of Phonological Processing; [3]: Dynamic Indicators of Basic Early Literacy Skills; [4]: Developmental Reading Assessment; [5]: Gates-MacGinitie Reading Tests; [6]: Kaufman Brief Intelligence Test; [7]: Measures of Academic Progress; [8]: Rapid Automatized Naming and Rapid Alternating Stimulus Tests; [9]: Test of Word Reading Efficiency; [10]: Wechsler Abbreviated Scale of Intelligence; [11]: Word Identification Fluency; [12]: Woodcock-Johnson Tests; [13]: Wide Range Achievement Test; [14]: York Assessment of Reading for Comprehension.

Other studies chose different methods from those noted above. Certain studies did not need to select a specific sample because they worked with the entire class group and they only carried out follow-up evaluations of the effectiveness of the instruction [50,51]. Some studies did not select specific samples because they sought to make an early identification of students with possible learning difficulties considered by family demographics (low socioeconomic status) and in some cases because developmental disabilities or language delays had been identified previously (method not specified) [52]. Burgoyne [53] worked with specific samples, in this case, students with down syndrome, so they did not require any additional criteria for the selection of the sample.

In some studies, selecting a specific sample meant that students needed to have had prior instruction based on the RtI model. Zhou [54], for example, selected participants based on two criteria: a) a below-average reading level for their grade; and b) they had not responded to a previous Tier 2 intervention. Following logistic regression with GMRT reading comprehension scores via the Test of Silent Word Reading Fluency (TOSWRF) and teachers' reading grades, Ritchey [35] selected students who presented a risk probability greater than 0.40. Finally, Wilkes [55] used a singular method, because in their final analysis sample, they included students who presented post-test data that were considered valid for the study (use of the online component Core 5 for at least 20 weeks during the school year and meeting recommended time of use for at least 50% of those weeks).

3.1.2. Evaluation/Monitoring in RtI Model

Some studies used methods for evaluation and monitoring that had been used previously to select the sample, whereas others opted for different methods to those used in the identification phase. This is summarized in Table 2.

Table 2. Assessment methods in the RtI model.

Studies	Tier	Selection Battery	Monitoring Battery	Variables and Monitoring Mode
[27] Greulich et al.	2, 3	WJ	AIMSweb CTOPP DIBELS KBIT TOWRE	• Knowledge of the sound of letters by fast and precise naming of letter sounds. • Phonological awareness through the sub-tests *Elision* and *Combined words*. • Fluency in oral reading by reading a passage from the grade level. • Cognitive variables, receptive vocabulary, and nonverbal reasoning using sub-tests verbal knowledge, puzzles, and matrix. • Fluency and accuracy of reading frequently used words and pseudo-words with irregular spelling patterns.
[28] Miciak et al.	2	GMRT and WJ	TOWRE	• Fluency and accuracy of reading frequently used words and pseudo-words.
[29] Al Otaiba et al.	1, 2, 3	AIMSweb TOWRE	DIBELS WJ	• Fluency in oral reading by reading a passage in a minute. • A psychoeducational battery to evaluate the accuracy and fluidity of oral reading of words and pseudo-words.

Studies	Tier	Selection Battery	Monitoring Battery	Variables and Monitoring Mode
[30] Denton et al.	3	TOWRE WJ	CTOPP DIBELS	• Phonological awareness with sub-tests *Elision* and *Combine words*. • Fluency in oral reading by reading a passage from the grade level in a minute.
[31] Al Otaiba et al.	1, 2, 3	AIMSweb TOWRE	DIBELS WJ	• Fluency in oral reading by reading a passage from the grade level in a minute. • Reading by identifying isolated and invented letters and words, decoding by identifying the sounds of letters, and comprehension by reading incomplete passages.
[32] Pericola et al.	1, 2	DRA WIF	CTOPP WJ WRMT	• Quick letter naming. • Oral reading of words and pseudo-words with a psychoeducational battery. • Basic reading skills and decoding by reading words and pseudo-words ordered in increasing difficulty and/or with reading of incomplete passages and fluency through the ability to identify words quickly and accurately.
[33] Romeo et al.	2, 3	CTOPP DIBELS KBIT RAN/RAS	TOWRE WRMT	• Fluency and accuracy of reading frequently used words and pseudo-words with irregular spelling patterns. • Basic reading skills and decoding, reading words and pseudo-words in increasing difficulty and with reading of incomplete passages.
[35] Ritchey et al.	2	Diagnostic report GMRT TOSWRF	TOWRE WJ	• Fluency and accuracy of reading frequently used words and pseudo-words with irregular spelling patterns. • Reading by identifying isolated and invented letters and words, decoding by identifying the sounds of complex letters and elements, and reading comprehension by reading incomplete passages.
[34] Chambers et al.	2	Diagnostic report	WJ	• Reading by identifying isolated and invented letters and words, decoding by identifying the sounds of complex letters and elements, and reading comprehension by reading incomplete passages.
[37] Bouton et al.	3	Expert judgement of the tutor WASI	TOWRE WRMT	• Fluency and accuracy of reading frequently used words and pseudo-words with irregular spelling patterns. • Basic reading skills and decoding by reading words and pseudo-words ordered in increasing difficulty and/or with reading of incomplete passages.

Table 2. *Cont.*

Studies	Tier	Selection Battery	Monitoring Battery	Variables and Monitoring Mode
[38] Castejón et al.	1	Expert judgement of the tutor	Collaborative Program of Fluency in Reading and Writing	• Quick access to lexical representations of frequent words with accuracy and speed. • Alphabetical domain with complex stimuli. • Prosody through enunciative, exclamative, and interrogative phrases.
[39] Cho et al.	2	Expert judgement of the tutor CTOPP	TOWRE WJ	• Fluency and accuracy of reading frequently used words and pseudo-words with irregular spelling patterns. • Evaluates reading by identifying isolated and invented letters and words, decoding by identifying the sounds of more complex letters and elements, and reading comprehension by reading incomplete passages.
[41] Svensson et al.	3	Expert judgement of the tutor	LOGOS	• Evaluate fluency by reading passages and reading comprehension through questions related to previously read passages.
[43] O'Connor et al.	2	DIBELS	WRMT [1]	• Basic reading skills and decoding by reading words and pseudo-words ordered in increasing difficulty and/or with reading of incomplete passages.
[44] Cho et al.	2	GMRT	AIMSweb	• Fluency of oral reading and reading skills by reading passages aloud and silent reading.
[45] Vaughn et al.	2	GMRT	WJ	• Evaluates reading by identifying isolated and invented letters and words, decoding by identifying the sounds of more complex letters and elements, and reading comprehension by reading incomplete passages.
[46] Ferroni et al.	3	Not specified	No specific	• Reading by speed in the recognition of words, phonological awareness by synthesis of sounds and omission of syllables, fast naming of stimuli, digits and letters.
[47] Jiménez et al.	2	Not specified	EGRA [2] No specific	• Knowledge of letters and sounds, phonetic awareness, reading of familiar words and passages and comprehension. • Knowledge of letters, vocabulary and fluency.
[48] Kim et al.	1, 2, 3	WJ	CTOPP	• Phonological awareness through the sub-tests *Elision* (reading whole words without specific sounds) and *Combined words* (measures the ability to orally combine phonemes and form whole words).

Table 2. *Cont.*

Studies	Tier	Selection Battery	Monitoring Battery	Variables and Monitoring Mode
[49] Duff et al.	2, 3	YARC	CELF	• Expressive vocabulary through image naming and test for reading invented words.
[50] Martens et al.	1	Not specified	CBM-R	• Evaluates the reading aloud through passages by the number of words read per minute.
[51] Steacy et al.	Not specified	Not specified	CTOPP TOWRE	• Phonological awareness through the sub-tests *Elision* (reading whole words without specific sounds) and *Combined words* (measures the ability to orally combine phonemes and form whole words). • Fluency and accuracy of reading frequently used words and pseudo-words with irregular spelling patterns.
[52] Milburn et al.	Not specified	Not specified	CELF [3] CTOPP TERA-3 [4]	• Expressive vocabulary with naming and test for reading invented words. • Phonological awareness through the sub-tests *Elision* (reading whole words without specific sounds) and *Combined words* (measures the ability to orally combine phonemes and form whole words). • Knowledge of letters and understanding of the meaning of words.
[53] Burgoyne et al.	2	Specific sample	APT [5] CELF EOWPT and ROWPT [6] TRG-2 [7] YARC	• Grammar and expressive information. • Knowledge of basic linguistic concepts. • Measures expressive and receptive vocabulary through different tests. • Evaluate grammatical constructions. • Early word recognition (EWR), knowledge of letters and sounds, combination of phonemes through image-word combination and reading of invented words and passages.
[54] Zhou et al.	2, 3	Specific criteria	AIMSweb	• Fluency of oral reading and reading skills by reading passages aloud and silent reading.
[55] Wilkes et al.	1	Specific criteria	DIBELS	• Fluency in oral reading by reading a passage from your grade level in one minute.

Note: [1]: Woodcock Reading Mastery Tests; [2]: Early Grade Reading Assessment Test; [3]: Clinical Evaluation of Language Fundamentals; [4]: Test of Early Reading Ability 3; [5]: Action Picture Test; [6]: Expressive and Receptive One-Word Picture Vocabulary; [7]: Test for Reception of Grammar 2.

The theoretical model recommends three assessments at Tier 1: at the beginning, at the middle, and at the end of the intervention. In this tier, evaluation was carried out at the beginning and at the end of the instructional period [18,50,55]. Some studies reported participant progress monthly [38,48], while others reported progress evaluations every two months [29,31].

At Tier 2, the theoretical model recommends a monthly assessment in addition to the initial and final assessments. In this tier, evaluation was maintained at the beginning and at the end of instruction [26,34,49,53], with intermediate evaluations, either every week [39,42,54] or every two weeks [28]. Other studies chose to evaluate participants every three weeks [32,35,43], monthly [45,47], bimonthly [27,29,31,44], or quarterly [36].

The RtI theoretical model calls for weekly evaluations in Tier 3. Most studies which included Tier 3 interventions did evaluations before and after the instruction [18,33,40,41,46,49], except for some studies that did weekly follow-up [37,55], Denton [26] who monitored progress monthly, and other studies where it was bimonthly [27,29,31].

3.2. Intervention in Different Tiers of the RtI Model

In the reviewed studies that implemented Tier 1 of the model, there were few that focused exclusively on this level, as shown in Tables 1–3. The instruction was delivered within the usual classroom, with the whole class group at the same time [38], except for the study by Wilkes [55], who worked individually (Table 3), other studies that used small working groups within the usual classroom [32,55] (Tables 3 and 4), and Jennings [18], who chose to work outside the ordinary classroom in non-teaching time (Table 5).

In terms of who implemented the intervention, there are differences between studies focusing solely on Tier 1 [38] (Table 3) and those working in combination with other tiers [32] (Tables 4 and 5). In the former, the form teachers/tutors gave the instruction, while in the latter, external staff predominated.

In terms of duration, studies combining the three tiers or first and third tiers chose 90-min sessions [18,29,31,48] (Table 6). The interventions were generalized instructions based on the teaching and training of reading skills, but each study had its own criteria, focusing on the aspects that they considered to be the most important. Several studies that implemented three tiers used the Open Court program to carry out reading and language instruction in Tier 1 [29,31,48] (Table 6). The same occurred with the books in the Houghton Mifflin Reader collection to work on reading, used by various studies [18,32] (Tables 4 and 5).

In studies using Tier 2 of the intervention model, instruction was generally given in small groups [26,34,45], although there were also studies that delivered the intervention with the full class group [53] or individually [42], as shown in Table 7. Most of the interventions were done in the school, although some studies did not specify the classroom [39], and very few detailed whether it was within the ordinary classroom [29,31] or outside of it [26,47]. One exception was Tilanus [36], who delivered the instruction in a professional clinic. The interventions were delivered by teachers/graduate students [27,28] and qualified staff from the research team [36,48,49].

Table 3. RtI model: Tier 1 intervention.

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[38] Castejón et al.	Not specified	Class group In ordinary classroom	Tutors	28 weeks For 7 months	Timed repeated reading of lists of words and phrases adapted to the level of the students. If the objective is achieved (the average of the class), the next list is read and if it is not, another of the same level is read. A notebook is used to practice at home in the same way and, if any student does little practice at home, the special education teacher complements the training at school.	In general, there is a reduction in reading times for short high frequency words and long low frequency words. Regarding errors and reading speed, they were reduced in relation to pre-intervention scores, where most subjects scored at risk. In general, subjects have improved in both conditions but should continue with training, but there were not statistically significant differences.
[50] Martens et al.	Not specified	Groups of 2–4 students In ordinary classroom	Graduate students and research assistants	30-min sessions	Fluency training with generalization and training passages extracted from AIMSweb. Training passages are created by modifying the generalization passage, retaining words, and replacing nouns and verbs with new ones.	There are significant differences between the ME (multiple exemplar) group and both the LWO (low word overlap) ($X2 = 7.54$, $p = 0.006$) and HWO group (high word overlap) ($X2 = 16.17$, $p = 0.001$). The difference between the LWO and HWO groups was not significant ($X2 = 1.90$, $p = 0.168$).
[55] Wilkes et al.	Not specified	Individual Place not specified	Teachers	20–60 min/week For 1 year	Reading instruction with the *Core5* program, focused on phonological awareness, phonetics, structural analysis, fluency, vocabulary, and comprehension. Students must complete each activity with at least 90% accuracy to advance to the next level. When students show inaccurate responses, *Core5* offers simplified activities. They also have access to paper and pencil tasks to develop automaticity and language skills.	Experimental group outperformed control group and the discrepancy between both on post-test scores was more pronounced when students had lower pretest scores, but there were not statistically significant differences.

Table 4. RtI model: combination of Tier 1 and Tier 2 interventions.

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[32] Pericola et al.	The mean fidelity across lessons was 90% (*SD* = 0.07)	Tier 1: small groups in 1st grade Tier 2: groups of 3 to 4 students Both in the ordinary classroom	Research assistants and graduates	16 h For 11 weeks	Tier 1: phonetic instruction, guided reading and activities focused on written language, study of words and spelling, using books from the Houghton Mifflin Reader collection. Tier 2: Each lesson contains three parts: (a) Phonological awareness and phonetic skills to reinforce letter-to-sound relationships. (b) Visual and decodable words, vocabulary and pre-reading comprehension strategies. (c) Fluency and reading comprehension, oral reading, discussion and word recognition.	The intervention significantly affected growth in Decodable Word Fluency, $F(1, 59) = 8.57$, $p = 0.005$, and Spelling of Words, $F(1, 88) = 5.85$, $p = 0.02$. In both cases, the results favored the intervention group.

Table 5. RtI model: combination of Tier 1 and Tier 3 interventions.

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[18] Jennings et al.	Not specified	Tier 1: 3rd grade group Tier 3: individualized instruction Both outside the ordinary classroom	Instructor	90 min, 5 days/week For 6 weeks	Reading instruction (vocabulary and fluency) at both levels is with the Houghton Mifflin Reading Program. In Tier 3, *Power Reading* is used to work on reading passages, comprehension with questions, and vocabulary. In the first session, they read aloud and write the unknown words that the instructor explains. In the second session, the words are reviewed and they are divided into base and affix words. In the third and fourth sessions, they create sentences with these words. In the fifth session, they read a passage aloud and answer questions.	The intervention group obtained statistically significant scores post-intervention compared to the administration of the pre-intervention tests on fluency, vocabulary knowledge, and reading comprehension. The intervention group and the control group started with similar scores on the NWEA MAP (15.8% for the intervention group and 13.5% for the comparison group) and, although the students in the experimental group started in the lower quartile, at the end of the intervention all were reading at or above grade level. In contrast, only three of the eight in the control group read at grade level on the posttest.

Table 6. RtI model: combination of Tier 1, Tier 2, and Tier 3 interventions.

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[29] Al Otaiba et al.; [31] Al Otaiba et al.	Inter-rater reliability was high (98.1%). Fidelity ratings for the tutors ranged from 0.77 to 0.98 ($M = 0.89$)	Tier 1: 1st grade group in the classroom Tier 2: groups of 4–7 students outside the ordinary classroom Tier 3: groups of one-three students outside the ordinary classroom	Tier 1: tutors Tier 2 and 3: qualified personnel	Tier 1: 90 min Tier 2: 30 min, two days/week Tier 3: 45 min, four days/week For 24 weeks	Tier 1: Basic reading and language arts instruction through *Open Court*. Tier 2: *Open Court activities Imagine It!* and the *Florida Center for Reading Research K-3 Center* that include phonological awareness and skills with letter sound, decoding, visual word instruction, and fluency. Tier 3: Early Interventions in Reading activities. Vocabulary is also worked on.	In the Al Otaiba study [29] there were not statically significant differences in pretest Reading factor scores for students in the Dynamic RTI compared to the Typical RTI groups. However, the Dynamic RTI group had statistically significantly higher posttest Reading scores than did students in Typical RTI, with a moderate effect size of 0.314. Tier 2 students in the Dynamic RTI condition obtained significantly higher reading outcomes scores compared to Tier 2 students in Typical RTI condition, who only received Tier 2 when they did not respond to Tier 1 over the first or second session. In the Al Otaiba study [31], ER (relatively easy to remediate) and SR (requiring sustained remediation) groups had statistically lower scores on TOWRE and oral reading fluency compared to the NR (no risk) group ($p < 0.01$). SR group also had statistically lower scores on the Letter Word Identification ($p < 0.01$). Compared with NR group, ER group in the Dynamic condition had higher scores on all the four reading outcomes in second grade ($p \leq 0.02$). In addition, ER group had statistically higher scores than NR group ($p \leq 0.03$) in all the reading outcomes ($p < 0.01$), except Passage Comprehension, while SR group had significantly lower scores than the NR group in the reading outcomes.
[48] Kim et al.	Test-retest reliability estimates were 0.88 for the blending and elision tasks for 5–7 years old children	Tier 1: 3rd grade group Tier 2: groups of 5–7 students Tier 3: groups of one-three students Unspecified location	Research team	Tier 1: 90 min daily Tier 2: 30 min, two days/week Tier 3: 45 min, four days/week For 24 weeks	All three tiers use the *Open Court* program and instruction is based on the relationship of language awareness and vocabulary with word reading and spelling.	Tier 1 group outperformed Tier 2 and 3 groups on linguistic awareness, phonological, and orthographic awareness measures ($p < 0.001$) but Tier 2 group did not differ from Tier 3 students on any measure (statistical significance at $p < 0.004 = 0.05/12$), as shown post hoc tests. Morphological awareness, phonological awareness, vocabulary, and orthographic awareness measures were all moderately related to end of year word reading and spelling ($0.41 \leq$ rs ≤ 0.63). The relation between morphological awareness, phonological awareness, vocabulary, and orthographic awareness measures were from weak ($r = 0.27$ between orthographic awareness and vocabulary) to moderate ($r = 0.68$ between morphological awareness and vocabulary).

Table 7. RtI model: Tier 2 intervention.

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[53] Burgoyne et al.	Not specified	1st grade group In school (unspecified classroom)	Teaching assistants	40 min/day For 20 weeks	Instruction follows a prescribed program with opportunities to tailor sessions according to the needs and skills of participants. It includes a reading chapter for teaching reading and phonetics and a language chapter for learning new vocabulary. Visual supports and simple games are also used as reinforcers.	Comparing t2 (20-week intervention period) with t1 (before intervention), there were statistically significant differences on single word reading ($d = 0.23$; $p = 0.002$), letter-sound knowledge ($d = 0.42$; $p = 0.002$), phoneme blending ($d = 0.54$; $p = 0.02$), and taught expressive vocabulary ($d = 0.47$; $p = 0.01$). There were not statistically significant differences between t3 (after the second 20-week intervention period) and t1.
[34] Chambers et al.	Not specified	Groups of 6 students in 1st and 2nd grade In the ordinary classroom	Certified teachers	45 min, four days/week For 13 weeks	They work on phonemic awareness, skills with letters, visual words, vocabulary, fluency, and understanding through a program that combines cooperative learning, computer-assisted instruction, integrated multimedia, and mentoring and evaluates strengths and reading difficulties.	Statistically significant differences were observed, such that the first-grade treatment group outperformed in the pre-test measures of LWID (Letter-Word Identification) to the individually tutored control group ($p = 0.05$, $\eta^2 = 0.28$) and marginally higher in the second grade ($p = 0.068$, $\eta^2 = 0.21$). In the LWID post-test ($\eta^2 = 0.17$, $p = 0.05$), WA (Word Attack) ($\eta^2 = 0.21$, $p = 0.04$), and PC (Passage Comprehension) ($\eta^2 = 0.15$, $p = 0.05$) statistically significant differences were also obtained.
[39] Cho et al.	Fidelity reached an average of 94.04%	Unspecified 1st grade groups At school (unspecified classroom)	Graduate students	45 min, three days/week For 14 weeks	Each session addressed: sight word reading, story words, letter sounds, phonological awareness and decoding, spelling, sentences and passage reading. For each activity, the previous session is reviewed and new information is entered.	WIF final level and growth were highly correlated with timed and untimed word reading ($r = 0.68$–0.89) and less highly correlated with timed and untimed word decoding ($r = 0.45$–0.68) and with passage comprehension ($r = 0.59$–0.70). WIF final level was also highly correlated with their growth during tutoring ($r = 0.89$).
[44] Cho et al.	Fidelity reached an average of 90%	5th grade groups Unspecified location	Research staff	30 min/day For 16 weeks	Multicomponent instruction aimed at vocabulary, word reading, fluency, and reading comprehension, all working through scientific texts. To improve basic reading skills, students received phonics instruction.	Pearson correlations indicate that the TOSREC (Test of Silent Reading Efficiency and Comprehension) and GMRT (Gates-MacGinitie Reading Tests) were only moderately correlated ($r = 0.26$, $p = 0.008$). Model 1 (ORF initial performance) and Model 2 (ORF slope) demonstrated a moderate correlation to the GMRT ($r = 0.32$, $p < 0.001$; $r = 0.23$, $p = 0.019$, respectively) and a slightly stronger correlation to the TOSREC ($r = 0.44$, $p < 0.001$; $r = 0.37$, $p < 0.001$, respectively). Model 3 (ORF initial performance and slope simultaneously) were also moderately correlated ($r = 0.47$, $p = 0.02$).
[26] Denton et al.	The mean program adherence score across tutors and observations was 4	Groups of 2–4 1st grade students Outside the regular classroom	Experienced clinical teachers or tutors	45 min, four days/week For 23–25 weeks	• Reading Group: guided intervention based on four components: introduction to the text, support for effective reading, teaching processing strategies, and text discussion. Short books leveled by difficulty are used. • Explicit intervention group: dedicates a third of the time to word study, another third to fluency practice and the last to comprehension. Students with poor decoding do not receive fluency instruction as they spend that time on other components, and those with good word reading accuracy also spend that time on other components.	There were statistically significant differences on Word Reading and Phonological Decoding between GR (Guided Reading) and TSI (Typical School Instruction) on Letter-Word Identification ($p < 0.05$); and between EX (Explicit Instruction) and TSI on both Letter-Word Identification ($p < 0.05$) and Word Attack ($p < 0.01$). Follow-up analyses revealed only a significant difference for WJ III Passage Comprehension between EX and TSI conditions ($p < 0.05$). For the measures of fluency (TOWRE, TPRI Passage Fluency) and for TOSREC (to measure Silent Reading Fluency and Comprehension), there were not statistically significant differences.

Table 7. *Cont.*

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[47] Jiménez et al.	Not specified	Groups of 4–6 students from kindergarten to 2nd grade Outside the ordinary classroom	Researchers	30 min/day For 12 weeks	Intervention carried out with the *PREDEA* program and focused on main components of reading, reading strategies, and educational activities that are grouped into different modules (phonological awareness, alphabetical knowledge, vocabulary, oral and reading comprehension, and fluency).	Results show that progress monitoring measures were significantly different in alphabetic knowledge $F (2.34, 109.81) = 42.31$, $p < 0.001$, $\eta^2 = 0.47$; isolation $F (2.42, 125.91) = 5.32$, $p < 0.01$, $\eta^2 = 0.09$; and phoneme segmentation task $F (3, 51) = 5.36$, $p < 0.01$, $\eta^2 = 0.24$. There were not significant differences found between the progress monitoring measures in vocabulary and word naming accuracy, $F (2, 39) = 0.31$, $p = 0.73$, $\eta^2 = 0.01$; $F (3, 40) = 1.79$, $p = 0.16$, $\eta^2 = 0.12$, respectively.
[28] Miciak et a	The intervention received a mean global fidelity score of 3.48 (SD = 0.55, range 2.00 to 3.82).	Groups of 4–5 4th grade students At school	Trained tutors	30 min/day For 16 weeks	A theme is covered for two weeks and in each session three activities were carried out: (a) Development of words and concepts through knowledge of vocabulary. (b) Reading of narrative or expository texts. (c) Study of words using decoding strategies.	There was significant group-by-task interaction, $F (10, 590) = 11.31$, $p < 0.0001$, $\eta^2 = 0.04$, on all six Executive Functions factors (Executive Functions, BRIEF/ Metacognition, Fluency, Self-Regulated Learning, Working Memory/Planning, and Working Memory/Updating)
[43] O'Connor et al.	The average fidelity rating for Tier 2 instruction in Grade 1 was 93%; and for Grades 2 to 4 89%	Groups of 2–3 students from 1st to 4th grade In school (unspecified classroom)	Special education and general education teachers	25–35 min, four days/week	In 1st grade the intervention is based on *Sound Partners* and includes explicit instructions on letters, sounds, decoding, word identification, and reading of prayers and books. In 2nd grade, the intervention includes word study, vocabulary, reading, comprehension strategies, spelling, and sentence writing are included. In 3rd and 4th, they work on comprehension, explicit decoding, and writing of more complex words.	The analysis did not reveal significant difference on measures of vocabulary or language use (Peabody Picture Vocabulary Test and Test of Oral Language Development) across cohorts (Grade 1: Cohort 1; Grade 2: Cohort 2 comparison group) (Wilks' lambda (2, 751) = 0.58, ns). M and SD for Cohorts 1 and 2, respectively, were PPVT = 86.78 (12.03) and 87.18 (12.61); TOLD = 8.11 (2.34) and 8.12 (2.35).
[35] Ritchey et al.	93% (SD = 4%) of the components were delivered and there were no significant differences in total fidelity per year, $F (121) = 0.05$, $p = 0.823$	Groups of 2–4 4th grade students At school	Research assistants	40 min, one day/week For 12–15 weeks	The intervention focuses on the understanding of expository texts, working on: • Fluency through reading of texts read in previous sessions. • Comprehension of vocabulary and texts. • Vocabulary introducing new words in each session. • Text instruction through silent reading aloud.	There were not significant differences on pre-post measures. Instead, there were statistically significant differences on post-test measures: group on ASKIT Comprehension (Assessment of Knowledge and Strategy Use for Information Text), $F (1, 16) = 10.09$, $p = 0.006$, favoring the intervention group, $g = 0.5631$; and group on Science Knowledge, $F (1, 16) = 12.70$, $p < 0.0031$, favoring the intervention group too, $g = 0.6458$.

Table 7. *Cont.*

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[36] Tilanus et al.	Not specified	2nd year groups in a professional clinic	Specialized professionals	45 min Phase 1: 12 sessions Phase 2: 36 sessions	In the first phase, grapheme-phoneme correspondences are taught and the basic reading level and the sublexic level are improved to strengthen the ability to combine phonemes and recognize groups of words and morphemes. The second phase focuses on declarative and procedural aspects and the reading of disyllabic and polysyllabic words. Syllabic segmentation is used, starting with phonological units.	For word decoding efficiency, the difference between Time 1 and Time 2 versus Time 2 and Time 3 was statistically significant, t (85) = −2.273, p = 0.026, d = −0.49. For pseudo-word decoding efficiency, the difference in growth was significant, in advantage for children with dyslexia during Time 1 to Time 2 t (223) = 2.016, p = 0.045, d = 0.27. For word decoding accuracy, the difference in growth was statistically significant between Time 1 and Time 2 t (215) = 2.05, p = 0.04, d = 0.28, and between Time 1 and Time 3 in advantage for children with dyslexia t (133.414) = 4.045, p = < 0.001, d = 0.70. For pseudo-word decoding accuracy, the difference in growth was statistically significant in advantage for typical readers. For word spelling, the differences in growth between Time 1 and Time 2 versus Time 2 and Time 3 within the group of children with dyslexia were significant, t (84) = −2.863, p = 0.005, d = −0.63.
[42] Van Norman et al.	Tutors followed intervention protocols with 96% accuracy on average.	Individuals Inside the classroom	Professionals	20 min/day	The *Reading Corps* literacy program is used. The intervention includes duet reading and repeated reading with comprehension strategies.	The observed differences in the proportion of students identified who did not achieve proficiency between Profile 1 (Below Average Start/Average Response) and Profile 2 (Average Start/Average Response) were statistically significant at the p < 0.05 level (χ2 (1) = 6.62, p = 0.010); the differences observed between Profile 1 and Profile 3 (Above Average Start/Fast Response) were statistically significant at the p < 0.001 level (χ2 (1) = 22.69), and the difference in the proportion of students identified as at-risk between Profile 2 and Profile 3 was statistically significant at the p < 0.001 level (χ2 (1) = 7.81).
[45] Vaughn et al.	The intervention had a fidelity of 96%	Groups of 2–4 students At the school	Researchers	30 min/day For 16 weeks	The intervention addresses word reading, fluency, vocabulary, and comprehension. It is organized in units of 10 lessons each, aligned with what is taught in ordinary classes and consists of three components: (a) Vocabulary: essential words are taught to understand texts. (b) Reading a passage. (c) Instruction in decoding.	Statistically significant differences were showed in the following measures: the very low word skills cluster had mean standard scores that ranged from 60.84 to 75.60; mean scores ranged from 77.00 to 88.63 for the low word skills cluster and 90.71 to 99.43 for the near-adequate word skills cluster. Mean scores were lowest on the TOWRE Sight Word assessment and highest on the WJ-III Spelling assessment in all three groups, and mean scores for each group were statistically significantly different from each other on each measure at p < 0.001.

There were differences with regard to session duration between studies that only implemented Tier 2 compared to studies that combined Tier 2 with other tiers. In most of the former, the sessions lasted between 40 and 45 min [35,36,39], while in the studies using more than one tier, the sessions were reduced to between 20 and 30 min [48] (Tables 4 and 6). There was particular emphasis in Tier 2 of the model on basic reading skills, such as phonological awareness [39,47], fluency [26,34,45], decoding [29,31,43], and vocabulary [28,48,53].

In the studies combining the second and third tiers of the model [27,49,54], instruction was delivered in small groups, as in the studies that focused exclusively on Tier 2. Where the intervention took place was only specified by Zhou [54]. In terms of duration, in the studies that implemented more than one tier, the sessions were reduced to 30 min [27] (Table 8).

Most of the studies that implemented Tier 3 of the intervention model delivered individualized instruction [37,46], although other studies decided to do the intervention in small groups of up to three participants [27,30]. Instruction generally occurred at school [41,46,49], although some studies specified that it was outside the usual classroom [18,30,40] (Table 9). As in the Tier 2 intervention, at Tier 3, instruction was delivered by teachers and graduate students [27,33,37] as qualified staff on the research team [18,40,46]. The sessions lasted from 20 min [46,49] to 90 min [18], with some lasting between 45 and 60 min [27,30]. In Tier 3, basic reading skills were worked on [30,37,41,46], adapted to the individual needs of the participants, working in stages so that they focused on a new component once the previous one had been fully acquired [18,27] (Tables 7 and 9).

Some studies performed the intervention in small groups of up to three participants [48]. Instruction was generally given at school, with a small number of studies specifying that it was to be done outside the ordinary classroom [29,31]. In studies combining all three tiers, instruction was given by both class tutors and qualified external professionals, even within the same study [29,31]. The sessions generally lasted for 45 min. Some of the studies which combined all three tiers performed, the interventions ranged from more general (Tier 1) to more intensive and individualized (Tier 3), but all worked on basic reading skills (see Table 6).

Table 8. RtI model: combination of Tier 2 and Tier 3 interventions.

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[49] Duff et al.	Not specified	Tier 2: groups of 2–4 students Tier 3: individualized instruction At school (unspecified classroom)	Research team	Tier 2: 30 min, two days/week Tier 3: 20 min, three days/week For 18 weeks	The *RALI* program is used for instruction, which includes *Reading Strand* (integrates training in phonological awareness and reading) and *Language Strand* (focuses on training vocabulary and narrative skills, using storybooks as the basis for its themes and structure).	At t2 (midtest evaluation), statistically significant but small effects were observed in letter knowledge ($d = 0.33$; $p = 0.27$) and early word reading ($d = 0.13$; $p = 0.34$). Small to moderate effects were also shown on phonemic awareness ($d = 0.57$; $p = 0.47$) and taught vocabulary ($d = 0.46$; $p = 0.40$). On the other hand, there are no significant differences between the groups in any measure of language or literacy in t3 (posttest evaluation).
[27] Greulich et al.	Fidelity of intervention implementation was observed to be high ($M = 0.89$)	Tier 2: groups of 4–7 students Tier 3: groups of 1–3 students Both in 1st grade In school (unspecified classroom)	Graduate students and certified teachers	Tier 2: 30 min, two days/week Tier 3: 45 min, four days/week For 24 weeks	Tier 2: activities taken from *Open Court Imagen It!* and the *Florida Center for Reading Research K-3 Center*. Phonological awareness and skills with letter sound, decoding, visual word instruction, and fluency are worked on. Tier 3: activities based on *Early Interventions in Reading*. Phonological, alphabetic, and phonetic fluency and awareness are worked on. Meaning is worked on at both levels (reading aloud from decodable books written to emphasize the structure of the text.	From the multivariate analysis of variance and the Wilk's lambda test statistic demonstrated a statistically significant multivariate main effect of membership (group of adequate and inadequate responders), $F (16, 139) = 2.191$ $p = 0.008$, with significant differences across most measures (Blending, Elision, Letter Word Identification, Word Attack, Passage Comprehension, Fluency Composite, Speece Rating, Verbal and Non-Verbal IQ, SSRS Academic, SWAN Inattention). The five main models that contain the information about the prediction of adequate and inadequate responders are: Letter Word, Fluency, Blending ($R^2 = 0.151$) (model that explains the greatest variation); IQ-non-verbal, Fluency, Blending ($R^2 = 0.129$); Word Attack, Fluency, Blending ($R^2 = 0.128$); Fluency, Elision, Blending ($R^2 = 0.126$); and Letter Word, Fluency, Elision ($R^2 = 0.125$).
[54] Zhou et al.	Not specified	Tier 2: groups of three-five students Outside the ordinary classroom Tier 3: individual At Home	Tier 2: researcher Tier 3: parents trained	Tier 2: 30 min, three days/week Tier 3: three days/week For 2 weeks	Tier 2: Phonics, word recognition and text reading are practiced. Tier 3: four conditions: • RR (repeated reading): reading a passage during four attempts (errors are corrected in the first three, not in the fourth attempt; what has been read in 1 min is recorded). • RR + EC (repeated reading with error correction): RR and if the student makes a mistake, the parents provide the correct word. • LPP + RR: parents read the passage aloud while the child does it silently. After that, RR is implemented. • LPP + RR + EC: LPP, RR and EC procedures described above.	There were no statistically significant differences for WCPM (words correct per minute) or EPM (errors per minute) for any of the students

Table 9. RtI model: Tier 3 interventions.

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[37] Bouton et al.	Administration on all testing and tutoring instruments have 90% or more accuracy	Individual to 1st grade students In school (unspecified classroom)	Teachers and research assistants	30 min/day For 35 weeks	Instruction sessions about sounds of letters, visual words, decoding and reading fluency. When they reach objectives, they go on to form small groups with 45-min sessions, three days per week with the same intervention program.	One-way MANOVA was conducted to test the hypothesis that there would be one or more mean differences between student groups in terms of overall word level reading and, with a $p < 0.10$ criterion, a statistically significant MANOVA effect was obtained, Wilks' $\Lambda = 0.828$; $F(4,43) = 2.228$; $p = 0.082$, with the multivariate effect size (η^2) estimated at 0.172, a large effect. This implied that 17.2 percent of the variance in the canonically derived dependent variable was attributable to the difference in intervention. This indicated that upside down RTI worked better than regular RTI on regarding reading proficiency, with a 10 percent probability that this difference was due to random sampling error.
[30] Denton et al.	The mean score for compliance with the program was 93% ($SD = 0.07$). The mean quality score across components and across teachers was 99% ($SD = 0.02$).	Groups of 2–3 2nd grade students Outside the ordinary classroom	Certified teachers	45 min For 24–26 weeks	*Responsive Reading Instruction* (RRI) is used and, for those who need more instruction, *Read Naturally*. Each *RRI* lesson addresses: a) Word study: includes phonological awareness, grapheme-phoneme correspondence, word recognition, phonological decoding, structural analysis and spelling. (b) Oral reading fluency. (c) Reading comprehension. (d) Application of skills and strategies in reading. In the second half of the intervention period, additional fluency instruction is given.	The Pre- and Posttest Means by Treatment Group showed statistically significant differences on WJ Basic Reading [$F = 8.13$; $p < 0.05$; $\eta^2 = 0.56$], WJ Letter-Word Identification [$F = 7.90$; $p < 0.05$; $\eta^2 = 0.44$], WJ Word Attack [$F = 5.78$; $p < 0.05$; $\eta^2 = 0.65$], TOWRE Sight Word Efficiency [$F = 5.07$; $p < 0.05$; $\eta^2 = 0.39$] and WJ III Passage Comprehension [$F = 3.95$; $p < 0.05$; $\eta^2 = 0.34$]. There were not statistically significant differences on TOWRE Phonemic Decoding Efficiency, DIBELS Oral Reading Fluency, and Gates Passage Comprehension.
[46] Ferroni et al.	Not specified	Individual to 6th grade students At school (unspecified classroom)	Research team	20 min, two days/week For 8 weeks	Stories are read aloud and Comprehension is supported by asking questions. Reading fluency is also worked on and activities are carried out with the lexical and sub-lexical units involved.	The analysis does not show statistically significant differences, in either of the two groups, between the pre and post-test measures.
[40] Georgiou et al.	Not specified	Individual Outside the ordinary classroom	Research assistants	30 min, three days/week For 10 weeks	The *Simplicity* intervention involves five steps: 1. Practice combining and segmenting phonemes. 2. Introduction, definition, and spelling of a new word. 3. Search for the word in books. 4. Shared reading of written texts that repeat the word. 5. Grapheme-phoneme correspondence.	Both SWI (Structured Word Inquiry) and Simplicity group were advantaged over control group when either morphological awareness or phonological awareness was included in the model ($p < 0.05$). At delayed post-test, the effect of condition approached significance when morphological awareness was included in the model. The effect reflected a larger mean estimate for SWI ($p = 0.051$) and Simplicity ($p = 0.073$) over control group at delayed post-test. Simplicity and SWI were advantaged over Controls across all decoding tasks when participants had stronger morphological awareness skills at pre-test ($p < 0.05$ in both cases).

Table 9. *Cont.*

Study	Fidelity	Group of Students	Who Performs the Intervention	Duration	Description of the RtI Model	Results
[33] Romeo et al.	Not specified	Groups of 3–5 students from 1st to 3rd grade At school (unspecified classroom)	Teachers	4 h, five days/week For 6 weeks	They train in phonological processing skills through a multisensory approach (the ability to recognize patterns and create mental representations of words allows a more solid understanding of the letters and their respective sounds) of the Seeing Stars plan.	Higher socioeconomic status (SES) correlated significantly with higher scores on receptive vocabulary (PPVT-4, $r = 0.37$, $p = 0.002$), with marginally with higher nonverbal cognitive ability scores (KBIT-2, $r = 0.023$, $p = 0.065$), and with higher scores on one of the four single-word reading subtests (WRMT-3 Word Attack: $r = 0.26$, $p = 0.036$; all other reading subtests $r < 0.17$, $p > 0.2$). Consequently, was marginally correlated with higher reading-composite scores ($r = 0.24$, $p = 0.05$). SES was not correlated with scores on any subtests assessing phonological awareness, phonological memory, or rapid naming (all $|r| < 0.08$, all $p > 0.50$).
[41] Svensson et al.	Not specified	Individual to 3rd grade students In school (unspecified classroom)	Special education teachers	35 sessions For 14 weeks	The *Omega-IS* and *COMPHOT* programs begin. Those who show problems in decoding fluency and accuracy receive more sessions with the second program; those with grammatical and reading comprehension problems receive sessions with the first program; those who show difficulty in phonological and spelling aspects receive sessions with both programs.	There was agreement between the test scores at T1 and T2 (Cronbach's alpha of 0.82 or above) for all variables (Word recognition, Reading fluency, Word and Non-word reading) except for reading comprehension (0.40). There were significant differences for the non-word reading test, where the group which obtained the COMPHOT intervention yielded a significantly higher gain ($p < 0.05$) than the combined group which had used both intervention methods. Control group outperformed the experimental group on the word recognition test both at T1 and at T4. However, the gap was less at T4 and there was a significant difference in the observed change score (CS) ($p < 0.001$) between the groups from T1 to T4, where the experimental group had a higher change score (8.5) than the comparison group (1.7).

4. Discussion

The implementation of the RtI model is an effective alternative in the field of early identification and intervention, as well as in the prevention of reading learning disabilities. In addition, its inclusive, personalized nature allows it to respond to those students who need more individualized instruction, and thus, Special Education would be the last option [47].

The purpose of this study was to perform a systematic review of empirical studies based on the RtI model in reading in Primary Education in order firstly to analyze what assessment measures are used to identify students with reading learning disabilities and secondly, to identify the most effective practices at different levels of intervention.

First aim with this study focused on analyzing the evaluation measures that have been used to identify students with reading learning difficulties. The most-used resource was standardized tests, although there is still no clear agreement on which tests are the most suitable for this early identification. This may be due to the type of study or the ability being evaluated. For example, Denton [26] focused on studying reading and used selection criteria based on scoring below the 30th percentile in the Basic Reading Skills Cluster subtest of the Woodcock-Johnson Test, while Greulich [27] focused on literacy, students having to score below the 25th percentile in the same test to be selected. The distance between the two percentiles is small, but it can make a big difference when it comes to identifying and selecting participants for the sample. In terms of aspects evaluated for the identification of students making up the sample, there are differences between the studies, although they can be grouped according to the reading component evaluate. The majority focused on decoding [26,27,30] and comprehension [28,48], some studies chose to measure fluency, either with Letter-sound [29,31] or with word reading or identification subtest [26,30,32], others focused on speed [33,46] and phonemic awareness [39]. Although some studies [33,43–45] did not specify the variable or aspect evaluated, clarifying that they only evaluated reading with the respective tests. Consequently, the most important next step would be to identify which are the most appropriate methods for identifying students and thus unify the criteria to be followed. Furthermore, it would be ideal to carry out these evaluations in the first years of Primary Education in order for the intervention to be as early as possible and avoid future problems and learning difficulties.

For monitoring progress, most of the studies that implemented Tier 1 of the RtI model only performed one evaluation at the beginning and another at the end of the intervention period, so they did not take consideration of the fundamental characteristics of the model, the frequency of evaluation at this first tier, ignoring the intermediate evaluation [14]. Something similar occurred in Tier 2 of the RtI model, many of the studies that focused on this tier only performed one evaluation at the beginning and another at the end of the instruction. Some studies did do bimonthly [29,31,44] or quarterly progress monitoring [36], but according to Jiménez and Crespo [14], the ideal is to monitor progress monthly, as in the study by Jiménez [47]. Other studies did fortnightly evaluation [28], but this may be too short to observe changes at this tier. Finally, in Tier 3 of the RtI model, it is assumed that weekly follow-up must be done, since the intervention must be adapted to individual students [14], although few monitored progress in this way [37,54]. These statements are based on the studies that came closest to the theoretical guidelines, such as Castejón [38] at Tier 1, Vaughn [45] at Tier 2, Bouton [37] at Tier 3, and Kim [48], who implemented the three tiers of the model. The results of these studies demonstrated good effectiveness. It is very important to monitor progress at appropriate times, as that allows feedback about instruction and is key for making decisions about the response to students' educational needs. One highly reliable, valid evaluation system is the IPAL System (Indicators of Learning Progress in Reading) for evaluating reading quickly and easily [56].

The second, to analyze the most effective practices at the different levels of the intervention. Until now, this model has been used to work on aspects related to reading, and has proven effective. Research on the effectiveness of interventions has shown that there are general improvements in reading outcomes and that difficulties can be reduced

due to these actions [40]. However, many studies did not carry out the interventions as outlined by the theoretical model. Tier 1 interventions did do instruction with all students in the regular classroom, but several studies opted for sessions of between 20 and 25 min when the theory holds that instruction should be maintained throughout the class time [14]. There was a similar picture with interventions focusing exclusively on Tier 2 based on this theory proposing 40 min sessions, while those that did more than one tier of instruction opted for shorter sessions. According to Jiménez and Crespo [14], the former studies would be correctly providing the instruction, but for Fuchs and Fuchs [19], the latter's method of monitoring would also be optimal because the validated protocol specifies sessions between 20 and 40 min. There is, therefore, a clear lack of consistency and unification of the model with specific, established guidelines (on times, the place of instruction, and the evaluation methods, for example), but this shows that an RtI model is not necessarily rigid. The Tier 3 intervention sessions in the different studies were not based on the most recent theoretical precepts, which indicate that they should last 60 min [14]. In addition, both Tier 2 and Tier 3 should be daily sessions, which is seen in few studies. As the level of intervention increases, instruction becomes individualized and specialized. While the studies that implemented Level 1 tended to work on general aspects of reading, in Levels 2 and 3, the instructions focused more on the basics, such as decoding, comprehension, and fluency. Increasingly specific instruction and instruction that is tailored to the student's needs means spending more time on it.

At Tier 1 of the RtI model, general education teachers were responsible for providing instruction in the classroom, so they had been qualified and have sufficient knowledge to be able to conduct instruction independently and competently [19]. In general, the reviewed studies met this criterion, except in some cases where instruction was provided by external personnel, either at the choice of the research team, due to the complexity of the program, or due to the teachers not knowing enough about it. Some of the Tier 1 interventions did not specify the fidelity of their interventions, although those that did reported a high percentage, over 90% [29,32].

In this Tier 1, the theoretical model holds that the instruction must be developed in the schedule of the subject, with the entire class group, and monitored in three moments (at the beginning, in the middle and at the end of the intervention) [14] and, although there are studies reviewed that meet these criteria, such as Wilkes [55] or Castejón [38] and which prove to be effective, there are also other studies that have obtained significant results, such as Martens [50], without the need to rely completely on theoretical precepts.

At Tier 2, the responsibility for instruction may lie with both general education teachers or other appropriately trained professionals [19]. These same authors argue that Tier 3 requires Special Education teachers, which did not see in the analyzed studies, since the same occurred as in the second tier, the instruction was provided both by teachers and external professionals hired by the research teams. In Tier 2 and Tier 3 interventions, the instructions also had high levels of fidelity similar to Tier 1 [29,31,39,42,45], although some studies did not specify it, which implies a certain limitation to the time to analyze the data.

There are studies that implement Level 2, either alone or together with other levels, which have been effective and have been based on the theoretical model, as is the case of Chambers [34] or Jiménez [47], performing the intervention in groups of up to six participants, with sessions of around 40–45 min. However, other studies such as that of Pericola [32] have also found statistically significant differences and, as has been observed, they have not been completely based on the theoretical precepts.

Although the theoretical model indicates daily 60-min sessions at Tier 3, 20-min sessions for three days a week have been shown to be effective too [27]. In this way, the application flexibility allowed by the RTI model is revealed.

As already mentioned, some interventions were directed and monitored by external personnel or hired by researchers, especially university educators and graduate students. However, in studies such Slavin [57] it was found that the effect size for tutorials carried out by teachers (ES = +0.62) was much higher than those carried out by paraprofessionals

(ES = +0.39). Brown [58] obtained the same results when comparing tutorials carried out by teachers and paraprofessionals with the same program, the effects being much greater for teachers (ES = +0.47). However, tutoring by paraprofessionals had higher results than those children who were not given tutoring (ES = +0.53).

It is not very clear what is the best place for instruction to be given in Tier 2, but the ideal would be for the teacher to carry out daily sessions of 40 min in the ordinary classroom to avoid segregation of the students who need a more specific response. Tier 3 instruction must be provided by need special education teacher (teachers of Therapeutic Pedagogy and Hearing and Language), since students need very specific responses based on their needs. The ideal would be instruction within the ordinary classroom, but being individualized and intensive, it seems more convenient to remove the student to a space without distractions.

The main limitation of our study was the difficulty in analyzing some aspects due to a lack of explicit information in the articles.

As future lines of work, the importance of training teachers in the RtI model should be emphasized, in early detection and identification of students with reading disabilities or who are at risk, and the development of recommendations for the teaching of reading based on empirical evidence.

5. Conclusions

In conclusion, the implementation of the RtI model in a flexible way adapted to the circumstances of each moment, can be considered as a highly effective resource in the prevention and early detection of reading learning problems. In this way, the work of the educational guidance staff, in charge of the specific training of teachers in the RtI model, will be essential. Scientific research will provide professionals in the educational field with the resources and training necessary to carry out this work, hence the value of empirical reviews such as this one, aimed at advancing the knowledge of the RtI model.

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