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How to teach children reading and spelling[1]

Abstract

Three-quarters of pupils in Dutch special education develop a substantial reading and spelling delay mainly due to poor instruction quality. 'How to teach children reading and spelling' (HTCRS), developed by Schraven (1994/2013), is an instruction method that helps teachers to become more effective and is based on the principles of direct and classroom instruction, and the task analysis of reading and spelling. This empirical study provides evidence for the effectiveness of this approach for pupils in special education. Reading and spelling performance of first-grade pupils from three different schools was longitudinally tested from the beginning until the end of the school year. There were no differences in literacy skills at the beginning, but at the end of the year substantially better performance emerged for those pupils who received instruction according to the HTCRS approach. Theoretically-based principles underlying HTRCS are presented as well as the main aspects of the didactics.

Key words: Reading, spelling, direct instruction, classroom instruction, task analysis, primary (special) education, experiment, Dutch language

Introduction

The publication of this volume presents us with the opportunity to inform English-speaking teachers and researchers about a successful experiment that reveals the power of reading and spelling instruction in first grade based on the principles of direct instruction. We will show that proper didactics enhances reading and spelling performance of pupils in special education in the Netherlands to a level that competes with that of standards in regular education. This is important, because about 73% of pupils in special education in the Netherlands have a substantial reading delay (van Bon, Bouwmans, & Broeders, 2006). Wide-spread agreement is emerging on the role of the teacher in educational learning. The development of reading and spelling skill is almost entirely determined by the teachers' skills rather than to be attributed to intelligence, socio-economic status, or reading disabilities (see for a meta-analysis, Hattie, 2009). Note that reading in the present paper refers specifically to reading decoding rather than reading comprehension. Spelling is the skill of writing down words by heart.

Spreading the knowledge that the teacher matters is the first step. The second more important one is to inform and educate teachers, teacher trainers, and educational psychologists, what precisely matters. Before we present the empirical study that provides unequivocal evidence of a successful Dutch instruction method, called 'How to Teach Children Reading and Spelling' (henceforth, HTCRS), we will discuss the theoretical arguments underlying HTCRS as well as preliminary empirical results obtained in earlier studies that were conducted to test its effectiveness.

Theoretical principles

HTCRS complies with three important educational principles that are supported by abundant empirical evidence. These principles are: Direct instruction, classroom instruction, and task analysis.

Direct instruction refers to a teacher who knows what (s)he is teaching and who actively and explicitly shares this knowledge with the pupil through modelling and reinforced guided performance (Joyce, Weil, & Calhoun, 2014). The main characteristics of direct instruction can be summarized as follows: Review of what is known so far; presentation of a new (knowledge) element to be added to the existing knowledge base; guided practice of the newly acquired element with the entire group; corrections and feedback during guided practice; independent practise immediately following group practise; daily, weekly and/or monthly exercising by testing and observation (Magliaro, Lockee, & Burton, 2005). Superior school performance is evident when novice learners and weaker pupils are taught by means of direct instruction rather than minimally guided instruction or discovery learning (for important papers on direct instruction, see Clark, Kirschner, & Sweller, 2012; Heward, 2003; Magliaro et al., 2005; for instruction manuals, see Hollingsworth & Ybarra, 2009; Lemov, 2010).

Classroom instruction refers to the interactions between a teacher and the group of pupils as a whole and is part and parcel of direct instruction. Effective classroom instruction requires the teacher to be in contact with individual pupils while the other pupils are present and are paying attention. Practicing materials that are the goal of a specific lesson with the other pupils being engaged as well has at least one important advantage that small-group or individual tutoring lack. Classroom instruction, when performed properly, is likely to affect weaker pupils positively, because they benefit from the challenge they are exposed to when the teacher engages with stronger pupils. It thus lessens the so-called Matthew effect (Stanovich, 1986). One important requirement needs to be fulfilled, namely, the teacher knows precisely the strengths and weaknesses of each of the pupils, such that (s)he can flexibly adapt the questions and exercises to the near-level of each individual pupil. Stated differently, the teacher should be able to make use of the zone of proximal development (Vygotsky in Chaiklin, 2003) geared to each of the pupils individually (see the next paragraph on task analysis). Daily classroom interactions between teacher and pupils guarantees knowledge about each pupil's skill almost effortlessly.

Task analysis is a principle derived from Russian educational theory that originated with Lev Vygotsky (see Haenen, 1998). The end goal of reading-decoding instruction is that pupils are capable of sounding out words that are presented to them. How to get to that stage is greatly helped by decomposing the task in separate distinguishable steps, leading to a sequence of smaller skills that makes learning easier. Execution of the next step is conditional upon getting the preceding step right (Simon, 1976; Struiksma, 1979).

Specifics of 'How to teach children reading and spelling'

The reading and spelling didactics HTCRS is to be used with a reading method. It provides the teacher with the 'How to' of instruction. This information is lacking or insufficient in Dutch reading methods. HTRCS is based on the principles of direct and classroom instruction and uses task analysis to break down the task of becoming literate into manageable steps. We will explain concisely how HTCRS implemented these specifics for the instruction of reading and spelling.

(Psycho)linguistic knowledge pertains to two types of knowledge a teacher needs to have to be able to teach reading and spelling effectively. First, the teacher needs to be completely familiar with the orthographic structure of the language and the rules that determine its spelling conventions (Moats & Lyon, 1996). Second, the teacher must be aware of the

specific problems that may hamper learning the orthography. For example, some words almost always pose a problem for the pupils. Teachers must not only be aware, but also anticipate this by providing for example, a mnemonic such that the pupils develop a means to remember the spelling of an atypical phoneme-grapheme relationship.

Dutch orthography is to a large extent covered by a set of 28 spelling categories of which some obey strict rules and others can be memorized using a mnemonic. An important orthographic rule is the consonant doubling rule or germination, which occurs in polysyllabic words with tense vowels and a single consonant at the end. For example, the word *ster* [star] contains the tense vowel /e/ followed by the single, final consonant r. Its plural version is *sterren* [stars]. The vowel remains tense, but the r has to be doubled to guarantee this reading. This spelling rule that states that consonants are doubled in case of a closed syllable remains one of the most difficult spelling rules in primary school. An example of a spelling mnemonic concerns words containing the sounds /a:j/, /o:j/, or /uj/, as in *haai* [hawk], *mooi* [beautiful], and *boei* [buoy]. To ease recollection, pupils are taught to say out loud: Words with /a:j/, /o:j/, or /oej/, they sound like /j/, but are spelled with i.

Multi-sensorial learning facilitates the acquisition of the prototypical sound-letter correspondences. The introduction of each grapheme will be presented visually together with its prototypical pronunciation. At the same time, the pupils will learn a hand gesture that accompanies the phoneme. For example, the hand gesture of the short sound of the phoneme /o/, spelled as O, is a circle made by the thumb and index finger of the left hand. The hand gesture of the long sound of the phoneme /o:/, spelled as OO, is made by the thumb and index finger of both hands, indicating that this grapheme is represented by two letters. Together with learning to recognize the letter, the pupils will practice the spelling by writing each grapheme a number of times. Reading and spelling, thus go hand in hand. In using all available modalities, that is, hearing, seeing, writing, and gesturing, embodied learning is encouraged, which guarantees stronger memory traces of prototypical grapheme-phoneme correspondences (e.g., Callcott, Hammond, & Hill, 2015).

Structured instruction refers to the order in which skills are practised. Formal reading and spelling instruction starts with learning prototypical phoneme-grapheme relationship. After two or three letters are presented, the teacher will make up words of the letters that have been taught. Pupils are only presented with words of which all constituent graphemes are known to them. Prior to a reading lesson, they will engage in blending phonemes together, and prior to a spelling exercise, they will practise phoneme segmentation. In both cases the role of the preparatory practise is explained. Each day, there is time devoted to reading and spelling with a strict order of exercises. A morning devoted to literacy in Grade 1 may look like this. The teacher starts the morning with a phoneme-blending exercise followed by reading words with familiar letters, continued with phoneme segmentation, and concluded by spelling words with letters they have been familiarised with. All classroom exercises are adapted to the different levels that are present in the class. The next phase constitutes guided instruction of new letters or spelling categories and collective classroom exercises. This is to be finished by independent practise of the new materials with each pupil working at their own level. A predictable order of exercises leads to a minimum of time loss during the different types of exercises, because the pupils know what is expected of them.

Error prevention is another important goal of HTCRS. Helping pupils to find the right answer to a question regarding the spelling or reading of a word, rather than guessing is at the heart of this instruction method. The teacher first explains new letters or spelling categories that

may obey a spelling rule. After the words are written the teacher will always ask the pupil why (s)he has written the word the way (s)he has. The pupil explains the spelling category, and by doing so, the classmates will hear the rule again. If a pupil does not know how to spell a particular word, because (s)he does not know the category or the rule, the teacher will ask one of the other pupils to help him or her. After having paid attention to the right answer provided by one of the classmates, the pupil will repeat the rule and apply it to the spelling at hand. This procedure will prevent that pupils start building erroneous ideas about the spelling of words that are often difficult to get rid of (McClelland, 2001).

Preliminary empirical findings

The development of HTCRS started in 1994. Some years later, the author of the didactics found three schools who were willing to introduce HTCRS in Grade 1 and also test the effect of the implementation. The study encompassed 141 pupils from regular education whose reading levels (98%) exceeded national levels. With respect to spelling it appeared that 76% had acquired spelling knowledge at the national level of the 25% best performing pupils (Schraven, 2000). In one of the schools with 95% ethnic-minority children Grade 1, 94% spelled at the highest national level for this grade, and with respect to reading all pupils went to Grade 2 with the required reading level. A small-scale study was conducted in a class for pupils with severe learning disabilities (average IQ level was 50). Lankhorst, Bosman, and Didden (2008) showed that in three months, pupils who were taught reading and spelling applying HTCRS had achieved a literacy level that usually requires at least two years of instruction.

Goal

The aim of the present experimental study is to establish whether pupils who are taught according to the principles of HTCRS have better reading and spelling skills than pupils who are not. School X applied all principles of HTCRS, whereas Schools Y and Z did not. The pupils engaged in this study were monitored from the day formal reading and spelling instruction started in Grade 1 until the end of the first school year. Reading and spelling tests were administered at four different times during the school year.

Method

Participants

In this study participated 44 pupils of three different schools for special education in the Netherlands. School X applied the didactics of HTCRS integrally. In School Z they made use of HTCRS articulatory gestures, but none of the other aspects of the didactics were applied systematically. School Y did not apply any of the HTCRS aspects. All three schools used Veilig Leren lezen [Safely learning to read], a well-known and widely used reading method in the Netherlands. Table 1 presents an overview of relevant characteristics of the participants. The pupils in Schools X (n = 11) and Z (n = 12) were taught as a single group in one classroom, whereas those from School Y (n = 21) were taught in three different classrooms.

Table 1. *Characteristics of the Three Groups of Participants in numbers of pupils*

School	Girls/Boys	Dutch 2nd Language	Diagnosis	Medication	Prior instruction
X	1/10	2	6	6	1
Y	7/14	0	0	2	4

Z	3/9	4	4	2	4
Totaal	11/33	6	10	10	20%

The number of boys (75%) exceeded that of girls (25%), which is a common pattern in Dutch schools for special education. Only 14% of the pupils were non-native speakers of Dutch, and 23% of the pupils were diagnosed with a specific disability (e.g., ADHD, PDD-NOS, and autism). The same number of pupils (23%) was on medication (e.g., Concerta, Ritalin). The majority of the pupils (80%) had not had any formal instruction in reading and spelling prior to this present study, whereas 20% of them had at least one year of formal reading- and spelling instruction.

Table 2 presents an overview of the mean ages of the three groups and their mean scores on three tests for cognitive abilities (see below). An analysis of variance with school as the independent variable and age in months as the dependent variable revealed a significant main effect of school, $F(2, 41) = 5.23$, $p = .01$. Bonferroni-corrected post-hoc tests showed that pupils from School Z were significantly older than those of the Schools X and Y (both p's $< .05$). No significant age differences were observed between School X and School Y.

Table 2. *Mean Age in Months and Mean Scores on All Five Cognitive Tests*

School		Age	SPM	VOC	LTM	DR	BDR
X							
	M	82	21.2	26.1	4.2	20.0	5.9
	SD	8.2	5.0	4.2	3.8	2.6	2.1
Y							
	M	83	20.1	25.3	4.1	19.4	5.8
	SD	5.4	7.4	2.6	2.7	3.2	2.1
Z							
	M	89	21.4	24.5	4.5	19.5	5.2
	SD	5.5	6.7	3.5	3.1	5.0	3.3

Note. SPM = Standard Progressive Matrices (max. score = 60), VOC = Passive Vocabulary (max. score = 38), LTM = Long-term memory (max. Score = 12), DR = Digit recall (max. score = 54), and BDR = Backward digit recall (max. score = 36).

To exclude potential relevant differences, all pupils were assessed on a number of cognitive tests. In February, pupils were presented with the Standard Progressive Matrices (SPM, Raven, 1958), a non-verbal intelligence test, as well as a test for receptive vocabulary (VOC), a subtest of the Revisie Amsterdamse Kinder Intelligentie Test (RAKIT, Revised Amsterdam Children Intelligence Test; Bleichrodt, Drenth, Zaal, & Resing, 1984). In June, all pupils were tested for memory skills. For the assessment of long-term memory, the 12-words test of Braams & Partners (www.tbraams.nl), which is an adaptation of Kalverboer and Deelmans' 15-words test (1986) was used. To assess short-term memory, both digit recall (DR) and backward digit recall (BDR) tests of the Working Memory Test Battery for Children (WMTB-C) by Pickering and Gathercole (2001) were used. One-way ANOVA's on each of the tests

with school as independent variable revealed no statistical differences between the mean scores on each of the cognitive tests (all *F*'s < 1).

Materials[1]

The test materials used in this study cover reading and spelling skills. Reading performance was assessed using standardized tests for word and text reading. Spelling performance was assessed using a 8-word dictation test and a standardized spelling test.

Word reading (Drie Minuten Toets [Three Minutes Test]; Verhoeven, 1995). The goal of this test was to assess word-decoding skill from the first test moment onwards. This standardized-reading test consists of three reading cards. Card 1 has 150 one-syllable words with one consonant at the beginning or end (i.e., vc, cv, and cvc words only). Card 2 contains 150 one-syllable words with more than one consonant at the beginning or end (i.e., ccvc, cvcc, cccvc, cvccc, ccvccc, cccvvccc, and cccvccc). Card 3 contains 120 multi-syllable words of all complexity levels. The pupils are presented with one card at the time and asked to read the words as quickly and as accurately for a minute. The score is the number of words read correctly per minute for each card separately.

Text reading (AVI; van den Berg & te Lintelo, 1977). The goal of this test is to assess decoding skills in the context of a text. The test consists of nine cards each containing a single story. Text 1 is a story that contains relatively easy words with a simple sentence structure, whereas the story of Text 9 has the most complex words and more complex sentence structure. The task is to read each text as quickly and as accurately as possible. Speed and number of errors is taken as an indication of text-reading level. There are only three norm scores. When both speed and accuracy suffice, reading level is referred to as 'Competency'. In case of appropriate speed but too many errors, or too slow, but hardly any errors, reading level is referred to as 'Instruction'. In case both speed and accuracy are insufficient, reading level is referred to as 'Frustration'. In March all pupil received Text 1 and Text 2. In June they were asked to read Texts 1, 2 and 3. Note that at the end of first grade (in June), pupils are supposed to achieve Competency level at Text 2.

8-Word dictation. The goal of this test was to track development of spelling skill from the first test moment onwards. The test consisted of eight words that were taken from the Dictation 2 of the standardized-spelling test described in the next paragraph. The words were *boot* [boat], *riem* [belt], *uur* [hour], *gum* [eraser], *wiel* [wheel], *kam* [comb], *soep* [soup], and *zaag* [saw]. Each correctly written word was rewarded with one point and the maximum score was 8.

Spelling test. (SVS; van den Bosch, Gillijns, Krom, & Moelands, 1991). The goal of this standardized-spelling test was to assess spelling skill. Two different tests have been developed by the Dutch Central Institute of Test Development. One to assess spelling levels in March and one for the end of the year, June. Three different writing-down to dictation spelling tests exist for testing in March: Test 1 contains 18 words, Test 2 has 22 words, and Test 3 has 23 words. The words of Test 1 are the easiest and those of Test 3 the hardest. Two different writing-down to dictation spelling tests exist for testing in June. Test 4 contains 20 words that are easier than those of Test 5 that contains 17 words. To enable statistical analyses, percentages correctly written words on each of the separate tests were computed.

Procedure

Research started in September when the pupils began formal reading and spelling instruction. Word reading and 8-word dictation were assessed four times (September, November, March, and June), whereas text-reading and SVS-spelling were assessed twice (in March and June). The first author did all the assessments with the help of two Special Education Master students of the Radboud University in Nijmegen, the Netherlands.

Results

MANOVA's with repeated measures were conducted with school (X, Y, Z) as between-subjects factor and test moment as within-subjects factor on the total number of correct readings and spellings. Because all interaction reached significance, ANOVA's were conducted on each of the test moments separately. These analyses reveal detailed information regarding the developmental trajectory of each of the schools; their results will be presented in the accompanying tables.

Word reading

Because the word-reading task consisted of reading three different cards, an extra within-subjects factor Card with 3 levels to the 3 (school: X, Y Z) x 4 (test moment: September, November, March, June) MANOVA for repeated measures was added. All main and interaction effects were significant. The values were: School: $F(2, 41) = 10.19$, $p < .0001$, partial $\eta^2 = .33$; Card: Pillai's trace = .76, $F(2, 40) = 62.53$, $p < .0001$, partial $\eta^2 = .76$; Test moment: Pillai's trace = .67, $F(3, 39) = 27.37$, $p < .0001$, partial $\eta^2 = .68$; Card * School: Pillai's trace = .37, $F(4, 82) = 4.65$, $p = .002$, partial $\eta^2 = .19$; Card * Test moment: Pillai's trace = .83, $F(6, 36) = 29.23$, $p < .0001$, partial $\eta^2 = .83$; School * Test moment * Card, Pillai's trace = .83, $F(12, 74) = 4.33$, $p < .0001$, partial $\eta^2 = .41$. Means and subsequent ANOVA's on each of the cards at all four test moments are presented in Table 3.

Table 3. *Number of Words Read Correctly in One Minute on the Word-Naming Tests*

School	X	Y	Z	*F*-value	*p*-value	comparisons
				Card 1		
September				1.47	.24	x = y = z
M	2.6	1.1	3.6			
SD	4.4	1.5	6.4			
November				4.24	.02	x > y; x = z; y = z
M	8.2	2.8	4.3			
SD	3.5	4.1	7.3			
March				12.44	.0001	x > y = z
M	27.3	9.0	10.8			
SD	11.2	6.9	13.8			
June				14.52	.0001	x > y = z
M	41.6	14.8	14.2			

SD	17.6	9.8	17.7			
				Card 2		
September				1.08	.35	x = y = z
M	0.6	0	1.1			
SD	1.6	0	3.8			
November				3.61	.04	x = y; x = z; z > y
M	1.6	0	2.3			
SD	2.3	0	4.2			
March				3.25	.05	x > y; x = z; y = z
M	9.6	3.5	5.2			
SD	6.4	4.8	8.6			
June				17.27	0001	x > y = z
M	24.4	5.0	6.7			
SD	13.3	5.7	9.7			
				Card 3		
September				1.36	.27	x = y = z
M	0	0	0.5			
SD	0	0	1.7			
November				1.85	.17	x = y = z
M	0.6	0	1.2			
SD	1.8	0	2.8			
March				3.47	.04	x > y; x = z; y = z
M	4.8	0.9	2.6			
SD	5.2	2.8	4.8			
June				12.39	.0001	x > y = z
M	14.6	1.7	4.2			
SD	11.0	3.9	6.9			

In summary, no performance differences occurred between schools in September, whereas at the end of the year in June, performance on all three cards were substantially and significantly better in School X than in Schools Y and Z.

Text-reading

The percentages of pupils who fell in each of the three levels of text-reading (i.e., Competency, Instruction, Frustration) are presented in Table 4. In March, the majority of pupils in School X had achieved Competency level on Text 1 and Instruction level on Text 2,

whereas the majority of Schools Y and Z were performing at the Frustration level. In June, the same pattern was observed. In June Text 3 was also assessed, showing that 64% of the pupils from School X had at least Instruction level. Level is based on the norms of the standardized AVI-reading test.

Table 4. *Frequency Distribution (in %) of the Norm Scores of Text-Reading in March and June*

		March			June		
		X	Y	Z	X	Y	Z
Text 1							
	Competency	55	0	8	73	19	8
	Instruction	18	10	8	18	10	17
	Frustration	27	90	83	9	71	75
Text 2							
	Competency	0	0	8	64	10	17
	Instruction	64	5	8	9	10	0
	Frustration	36	95	83	27	81	83
Text 3							
	Competency				28	0	8
	Instruction				36	0	8
	Frustration				36	100	83

8-Word dictation

All main and interaction effects were significant: School, $F(2, 41) = 6.56$, $p = .003$, partial $\eta^2 = .24$; Test moment, Pillai's trace = .90, $F(3, 39) = 111.02$, $p < .0001$, partial $\eta^2 = .90$; School * Test moment, Pillai's trace = .66, $F(6, 80) = 6.54$ $p < .0001$, partial $\eta^2 = .33$. Means and subsequent ANOVA's are presented in Table 5.

Table 5. *Number of Words Spelled Correctly on the 8-Word Dictation (Maximum score = 8)*

School		X	Y	Z	*F*-value	*p*-value	comparisons
September					2.24	.12	x = y = z
	M	0.6	0.1	1.1			
	SD	0.8	0.5	2.2			
November					4.07	.02	x > y; x = z; y = z
	M	3.8	1.3	1.8			
	SD	1.3	2.5	3.0			
March					13.00	.0001	x > y > z
	M	7.4	5.1	3.0			

	SD	0.8	1.9	3.0		
June					4.5	.02	x > z; x = y; y = z
	M	7.5	5.8	4.8		
	SD	0.9	2.1	3.0		

In sum, no performance differences occurred between schools in September. In November School X had superior performance to School Y. In March, performance in School X was superior to Schools Y and Z. In June, School Y, but not School Z, had caught up with School X.

Spelling test

A 3 x 3 MANOVA for repeated measures was conducted with School (X, Y, Z) as between-subjects factor and Test (1, 2, 3) as within-subjects factor on the number of percentages correct responses. All main and interaction effects were significant: School, $F(2, 41) = 10.85$, $p < .0001$, partial $\eta^2 = .35$; Test, Pillai's trace = .80, $F(2, 40) = 81.00$, $p < .0001$, partial $\eta^2 = .80$; School * Test, Pillai's trace = .39, $F(4, 82) = 4.88$ $p < .0001$, partial $\eta^2 = .19$. The means and subsequent ANOVA's on the three spelling tests administered in March are presented in the upper panel of Table 6.

A 3 x 2 MANOVA for repeated measures was conducted with School (X, Y, Z) as between subjects-factor and Test (4, 5) as within-subjects factor on the number of percentages correct responses. All main and interaction effects were significant: School, $F(2, 41) = 17.36$, $p < .0001$, partial $\eta^2 = .46$; Test, Pillai's trace = .46, $F(1, 41) = 34.45$, $p < .0001$, partial $\eta^2 = .46$; School * Test, Pillai's trace = .15, $F(2, 41) = 3.63$, $p = .04$, partial $\eta^2 = .15$. The means and subsequent ANOVA's on the two spelling tests administered in June are presented in the lower panel of Table 6.

Table 6. *Mean Percentages Correct on the SVS Spelling-Tests*

School	X	Y	Z	*F*-value	*p*-value	comparisons
				March		
Test 1				5.31	.009	x > z; x = y, y = z
M	92.4	75.7	56.9			
SD	10.0	25.1	36.2			
Test 2				9.39	.0001	x > y = z
M	82.6	51.5	37.1			
SD	13.9	25.5	33.5			
Test 3				17.41	.0001	x > y = z
M	80.2	37.7	23.6			
SD	18.7	25.3	26.3			
				June		
Test 4				8.68	.001	x > y = z

M	85.9	58.8	40.0			
SD	17.0	24.4	35.7			
Test 5				25.21	.0001	x > y = z
M	79.1	32.8	19.6			
SD	24.9	20.0	20.1			

In sum, School X reveals superior spelling knowledge in both March and September. Note also, that performance differences in March between Tests 1, 2 and 3 and in June between Tests 4 and 5 were considerably smaller in School X than in the other two schools. A higher number indicates more difficult words. The relevance of this finding will be discussed shortly.

Discussion

The results of this study reveal clear and substantial merits of How to teach children reading and spelling (HTCRS. At the start of the school year, literacy skills of all three schools were almost non-existent. At the end of the school year, word-reading skills in School X were 3 to 4 times better than those of pupils in the other two schools. With respect to text reading, 64% of the pupils in School X had achieved competency level for Text 2 (the goal for year 1), whereas in School Y and Z only 10% and 17%, respectively, managed to perform at that level.

Spelling skill on the 8-word dictation was superior for School X in March; in June School Y had caught up, but School Z had not. The results of the standardized SVS-spelling tests revealed substantial and superior performance for School X. In March as well as in June, the pupils in School X were almost performing at ceiling, whereas the pupils from the other schools showed low to very low spelling skills. An interesting finding of the SVS-test results is the fact that pupils at School X had an 80% correct on all SVS-tests, despite of the fact that with increasing test number, the difficulty of the words to be spelled increased. Unlike the pupils at Schools Y and Z, the pupils at School X, apparently learned the underlying structure of the words and were therefore able to spell words with multiple consonants at the end and the beginning of words, such as, ccvc, cvcc, cccvc, ccvccc.

Thus, the pupils who were taught reading and spelling according to HTCRS achieved literacy skills that can easily compete with those in regular education. The pupils who were not taught with HTRCS performed at the level of pupils in special education. Thus, unlike common belief, basic skills like reading and spelling do not have to be delayed in pupils attending special education. It is important to add that all three schools devoted the same amount of time on reading and spelling, about 2 hours a day. None of the children in School X received extra-curricular instruction, whereas some of the children in Schools Y and Z did. Note also that the application of the principles of HTCRS do not require additional time; in fact it saves time, because it is efficient and effective.

HTCRS is not developed specifically for pupils in special education. We know that the didactics prevents the development of reading and spelling problems. In the introduction, we already showed its success in Grade 1 of three regular schools for primary education. To substantiate the claim that HTCRS is a very successful didactics all the way through primary school, we investigated the results of one school in the Netherlands that decided to adopt

the approach (Bosman, 2009). They started in Grade 1 and after six years the approach was implemented all the way through Grade 6, which marks the end of primary school in the Netherlands. The average socio-economic status of this school was low and 30% of the children came from ethnic minorities.

Average word-reading performance of all pupils in all grades was equal to national levels of the 20% best scoring pupils. With respect to text reading, all pupils had reached the required reading level of AVI-9 in Grade 5. Note that on average, 25% of children leave primary school with an insufficient literacy level (Teuwen, 2007), insufficient for functional literacy. The spelling results were even more spectacular. Before the implementation of HTCRS, almost 50% of the pupils performed at the national level of the 25% lowest-scoring pupils. After the introduction the spelling levels were at the highest national levels; on average 75% of the pupils belonged to the 20% best-performing spellers. During the six years of observation, only 1.5% of the pupils (6 in total) had at some point a below-average spelling level.

Because all children deserve to be taught properly, schools have a responsibility to apply effective and efficient methods. Our research reveals quite clearly that reading and spelling problems are almost unnecessary. The last decade saw an increase of children diagnosed with dyslexia amounting to 15% of children in secondary in the Netherlands (Sontag & Donker, 2012). These numbers are unacceptable given the results we presented above.

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Footnote

1. Parts of the results in this paper have been published in a Dutch journal (Bosman, 2007).
2. In the original study, four more tests were used (see Bosman, 2007). Space limitations prevents us from describing the results of tests of phoneme blending, phoneme segmentation, letter naming, and letter spelling. The findings are highly similar to the results of the tests presented here.

References

Bleichrodt, N., Drenth, P. J. D., Zaal, J. N.,& Resing, W. C. M. (1984). *Revisie Amsterdamse Kinder Intelligentie Test, RAKIT* [Revision Amsterdam Child Intelligence Test]. Lisse, The Netherlands: Swets & Zeitlinger.

Bosman, A. M. T. (2007). Zo leer je kinderen lezen en spellen [How to teach children reading and spelling]. *Tijdschrift voor Orthopedagogiek, 46,* 451-465.

Bosman, A. M. T. (2009). *Gerichte instructie in lezen en spellen voorkomt lees- en spellingproblemen bij (vrijwel) alle leerlingen op 'Het Kofschip'* [Direct instruction in reading and spelling prevents reading and spelling problems in (almost) all students at

'Het Kofschip']. Retrieved December 21st, 2015 from http://www.annabosman.eu/documents/Bosman2009_001.pdf

Callcott, D., Hammond, L., & Hill, S. (2015). The synergistic effect of teaching a combined explicit movement and phonological awareness program to preschool aged students. *Early Childhood Education Journal, 43,* 201-211. Doi:10.1007/s10643-014-0652-7

Chaiklin, S. (2003). The zone of proximal development in Vygotsky's analysis of learning and Instruction. In A. Kozulin, B. Gindis, V. Ageyev, and S. Miller (Eds.), *Vygotsky's educational theory in cultural context* (pp. 39–64). Cambridge, UK: Cambridge University Press.

Clark, R. E., Kirschner, P. A., & Sweller, J. (2012). Putting students on the path to learning. The case for fully guided instruction. *American Educator, 36*, 6-12. No doi.

Haenen, J. (1998). Piotr Gal'perins visie op de vormgeving van onderwijsleerprocessen [Piotr Gal'perin's view on the creation of educational learning processes]. *Pedagogische Studiën, 75,* 238-249.

Hattie, J. (2009). *Visible learning*. *A synthesis of over 800 meta-analyses relating to achievement.* London, UK: Routledge.

Heward, W. L. (2003). Ten faulty notions about teaching and learning that hinder the effectiveness of special education. *The Journal of Special Education, 36,* 186-205. Doi:10.1177/00224690303600401

Hollingsworth, J. & Ybarra, S. (2009). *Explicit direct instruction. The power of the well-crafted, well-taught lesson*. London, UK: Sage.

Joyce, B. R., Weil, M., & Calhoun, E. (2014). *Models of teaching 9th Edition*. London, UK: Pearson

Kalverboer, A. F., & Deelman, B. G. (1986). *De 15-woordentests A en B* [The 15-words tests A and B]. Groningen, The Netherlands: Academisch Ziekenhuis.

Haenen, J. (1998). Piotr Gal'perins visie op de vormgeving van onderwijsleerprocessen [Piotr Gal'perin's view on the creation of educational learning processes]. *Pedagogische Studiën, 75,* 238-249.

Lankhorst, W., Bosman, A. M. T., & Didden, R. (2008). Het effect van twee instructiemethoden op lees en spellingvaardigheden bij kinderen met een lichte tot matige verstandelijke beperking [The effect of two instruction methods on the reading and spelling skills of children with mild to moderate intellectual disabilities]. *Nederlands Tijdschrift voor de Zorg aan Verstandelijk Gehandicapten, 34,* 181-193.

Lemov, D. (2010). *Teach like a champion: 49 techniques that puts students on the path to college (K-12)*. San Francisco, CA: John Wiley & Sons, Inc.

Magliaro, S. G., Lockee, B. B., & Burton, J. K. (2005). Direct instruction revisited: A key model for instructional technology. *Educational Technology Research and Development, 53(4),* 41–55. Doi:10.1007/BF02504684

McClelland, J. L. (2001). Failures to learn and their remediation: A Hebbian account. In J. L. McClelland & R. S. Siegler (Eds.), *Mechanisms of cognitive development: Behavioral and neural perspectives* (pp. 97-121). Mahwah, NJ: Lawrence Erlbaum Associates.

Moats, L. C., & Lyon, G. R. (1996). Wanted: Teachers with knowledge of language. *Topics in Language Disorders, 16,* 73-86. No doi.

Pickering, S. J., & Gathercole, S. E. (2001). *The Working Memory Test Battery for Children. The WMTB-C*. Londen, UK: The Psychological Corporation.

Raven, J. C. (1958). *Standard Progessive Matrices*. London, UK: H.K. Lewis.

Schraven J.L.M. (2000). Gerichte instructie geeft betere resultaten bij lezen én spellen [Direct instruction leads to better reading and spelling results]. *Zorg Primair, 1,* 1-6.

Schraven, J. L. M. (2013*). Zo leer je kinderen lezen en spellen*, 8e druk [How to teach children reading and spelling, 8th edition). Zuthpen, the Netherlands: TGM.

Simon, D. P. (1976). Spelling - A task analysis. *Instructional Science, 5,* 277-302. Doi:10.1007/BF00054359

Sontag, L., & Donker, M. (2012*). Dyslexie en dyscalculie in het voortgezet onderwijs. Herhaalde meting* [Dyslexia and dyscalculia in secondary education. Repeated measure]. 's Hertogenbosch, the Netherlands: KPC.

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21*, 360-407. Doi:10.1598/RRQ.21.4.1

Struiksma, A. J. C. (1979). Leren lezen, een taakanalyse [Learning to read, a task analysis]. In J. de Wit, H. Bolle, & J. M. van Meel (Eds.), *Psychologen over het kind, deel 6* (pp. 121-142). Groningen, the Netherlands: Wolters-Noordhoff.

Teuwen, J. H. J. (2007). *De staat van het onderwijs. Onderwijsverslag 2005/2006* [The status of Education. Educational report 2005/2006]. Utrecht, the Netherlands: Inspectie van het Onderwijs..

van Bon, W. H. J., Bouwmans, M., & Broeders, I. N. L. D. C. (2006).The prevalence of poor reading in Dutch special elementary education*. Journal of Learning Disabilities, 39,* 482-495. Doi:10.1177/00222194060390060101

van den Berg, R. M., & te Lintelo, H. G. (1977). *AVI: Analyse van Individualiseringsvormen* [Analysis of individualisation forms]. 's Hertogenbosch, The Netherlands: KPC.

van den Bosch, L., Gillijns, P., Krom, R., & Moelands, F. (1991). *SVS: Schaal Vorderingen in Spellingvaardigheid* [Scales on progress of spelling skills]. Arnhem, The Netherlands: Cito.

Verhoeven, L. (1994). *Drie Minuten Toets* [Three Minutes Test]. Arnhem, The Netherlands: Cito.