International Education Studies; Vol. 14, No. 11; 2021
ISSN 1913-9020 E-ISSN 1913-9039
Published by Canadian Center of Science and Education

Using a Simultaneous Prompting Procedure to Improve the Quality of the Writing of Three Students with Learning Disabilities

Kerstin Nobel[1], Anne Barwasser[1], Matthias Grünke[1], Kristie Asaro-Saddler[2] & Bruce Saddler[2]

[1] Department of Special Education & Rehabilitation, University of Cologne, Germany

[2] School of Education, University at Albany, USA

Correspondence: Kerstin Nobel, Department of Special Education & Rehabilitation, University of Cologne, Klosterstr. 79b, Cologne, Northrhine-Westfalia, 50931, Germany. E-mail: kerstin.nobel@uni-koeln.de

Received: March 3, 2021 Accepted: June 2, 2021 Online Published: October 28, 2021

doi:10.5539/ies.v14n11p81 URL: https://doi.org/10.5539/ies.v14n11p81

Abstract

The purpose of this experiment was to determine the effects of a simultaneous prompting procedure on the writing performance of three upper-elementary-level students diagnosed with learning disabilities (LD). Interventionists gave task directions followed by model prompts with a 0-s time delay to teach students composition. Non-targeted information related to the writing process was embedded in the form of progress monitoring. A multiple-baseline design across participants (AB) was used to assess the effectiveness of the intervention. Results indicate that the simultaneous prompting procedure positively affected the overall quality of writing of students with LD. Implications for practice and future research are discussed.

Keywords: writing, learning disabilities, simultaneous prompting

1. Introduction

When considering the importance of being able to compose texts, one might be inclined to think that this skill is most relevant for people who are pursuing a career in a literary field, such as academia or journalism. However, the significance of being able to put one's thoughts on paper goes far beyond that. For example, writing assignments, written test answers, essays, and reports are typical ways of assessing students' academic success in school (Graham, 2006). In addition, writing is used not only to evaluate learning, but also to facilitate it (Gillespie et al., 2014; Graham & Hall, 2016). Therefore, the ability to compose texts is a crucial skill for success in school, and students who struggle to think on paper are at a clear disadvantage (Gillespie & Graham, 2014; Graham et al., 2017). Writing remains relevant when entering higher education or the job market (Graham & Harris, 2011). Moreover, it is also important in everyday social contexts. The information society has greatly increased the amount of information available online and has made literacy a pivotal skill for finding, analyzing, and interpreting these resources (Grönlund & Genlott, 2013). Hence, proficiency in writing-related activities has become critical for active participation in society.

The writing process integrates many complex tasks, including planning, transcribing, and reviewing (Hayes & Flower, 1980). These activities need to be performed recursively, and nearly simultaneously, while a writer is composing. Besides, all of these tasks are interrelated, meaning that weakness in one area can impact the others. In a later adaption of his original model, Hayes (1996) emphasized the role of individual, pointing to high motivation, well-coordinated cognitive processes, and fully developed working memory as prerequisites for effective text production.

Despite the influence writing has on success in life and the complexity of the writing process, writing instruction typically does not receive much attention in schools, as reported in multiple studies from around the world (e.g., Håland et al., 2019; Hsiang et al., 2018; Rietdijk et al., 2018). Reasons for this unfortunate situation include a lack of teacher training in writing instruction and the limited time teachers typically spend on teaching writing skills or strategies, notably after Grade 3 (Applebee & Langer, 2011; Gilbert & Graham, 2010; Kiuhara et al., 2009; Rietdijk et al., 2018; Wijekumar et al., 2019). As a result, it is not surprising that many students have difficulty navigating and succeeding at the task of text production.

1.1 Students with Learning Disabilities

One group of students who are at particular risk for not meeting basic writing achievement levels are students with

learning disabilities (LD) (Graham et al., 2017). According to Graham and Harris (2011), 19 out of 20 students with LD do not acquire adequate writing skills to succeed in school. These children and youth demonstrate difficulties across all parts of the writing process. Specifically, during planning, students with LD spend less time than their typically achieving peers on prewriting activities and generating ideas (Gillespie & Graham, 2014), and in terms of transcribing, they experience problems with spelling, handwriting, and typing, leaving little room in working memory to apply to content, meaning, and coherence (Baker et al., 2003; Gillespie & Graham, 2014). Further, when revising, young people with LD typically focus only on grammar, spelling, and mechanics (Graham et al., 1995), leading to texts that often lack coherence, clarity, and purpose (Graham et al., 2017). Finally, given how challenging, cognitively overwhelming, and time-consuming the task of writing is for this group of students, it is perhaps not surprising that researchers report a lack of motivation and negative attitude towards writing in students with LD (Gillespie & Graham, 2014; Graham & Harris, 2009).

Considering the lifelong importance of being able to write effectively, it is critical to provide teachers with effective and evidence-based interventions to support students' writing. Several meta-analyses provide an overview of interventions for students with disabilities who struggle with text composition (Cook & Bennett, 2014; Gillespie & Graham, 2014; Gillespie Rouse & Sandoval., 2018; Kaldenberg et al., 2016). Most of the studies reviewed were single-case research designs, and a majority of the approaches with positive effects were related to implementation of the Self-Regulated Strategy Development (SRSD) framework by Harris and Graham (1996), a thoroughly validated model whereby teachers systematically teach strategies for the writing process. Treatments that focus on the *planning* or *revising* part of the writing process were identified as effective, as long as they are instructive in nature. Sentence combining has also proven to be an effective intervention in improving text quality (Saddler et al., 2018). Other interventions identified in the meta-analyses as being effective in supporting struggling students' writing include *goal setting*, *prewriting activities,* and *strategy instruction*.

1.2 The Simultaneous Prompting Procedure

One promising strategy for systematic writing instruction for students with LD is simultaneous prompting, defined as a planned, systematic instruction method, where individualized, controlling prompts are presented to the student immediately before or after instruction to evoke a correct response (Gibson & Schuster, 1992). Prompts may be verbal, visual, or physical. By allowing the student to respond to the prompt rather than having the opportunity to give an independent response, it serves as an errorless learning strategy (Tekin-Iftar et al., 2018). Educational approaches that minimize opportunities to make mistakes provide more opportunities for positive reinforcement (Gibson & Schuster, 1992). Adding non-targeted information to a simultaneous prompting intervention, as in Hudson (2013), can improve learning outcomes (Albarran & Sandbank, 2018; Smith et al., 2011). Non-targeted information provides the opportunity to increase students' exposure to information without also increasing instructional time (Smith et al., 2011). It can be placed before, during, or following a prompting procedure and can be related or unrelated to the intended learning outcome.

One way of implementing non-targeted information as part of simultaneous prompting procedures is the use of progress monitoring, which involves frequent assessment of a student's performance in specific skill areas (Shapiro et al., 2011). This process can have a very motivating effect on struggling writers (Hisgen et al., 2020). Graham et al. (2017) suggest that enhancing motivation and confidence to write is important for students with LD to become skilled writers and can enhance writing performance (Graham, 2006). Additionally, the non-targeted information can be acquired in the form of incidental learning (Werts et al., 1995) without additional demands to the learner. Simultaneous prompting procedures can be used for both discrete tasks (single unit tasks like naming vocabulary) and chained tasks (tasks that consist of multiple steps). A chained task simultaneous prompting procedure for writing would include systematic instruction in a sequence of responses to facilitate a step-by-step writing intervention (Birkan, 2005; Hudson et al., 2013; Rao & Cane, 2009).

Simultaneous prompting has been shown to be an effective teaching method for students with and without disabilities between the ages of preschool and adulthood (Morse & Schuster, 2004; Tekin-Iftar et al., 2018; Waugh et al., 2011). For example, a literature review by Waugh et al. (2011) suggests an effectiveness rate of 93% within the 35 peer-reviewed studies examined with 126 out of 136 participants reaching criterion during the simultaneous prompting intervention. In addition, Morse and Schuster (2004) reported positive effects on maintenance and generalization of skills.

The procedure has also been found effective for children with disabilities. For example, Tekin-Iftar et al. (2018) concluded that there is substantial evidence that the simultaneous prompting procedure is effective across participants with a variety of disabilities, across ages and target skills. Further, there is also some support for the use of simultaneous prompting in writing instruction with students with disabilities. For example, Hudson et al.

(2013) used this approach, including non-targeted information, to teach paragraph composition to students with emotional and behavioral disorders, resulting in positive effects and generalization effects to other writing tasks. Non-targeted information was also acquired. Other studies found positive impacts for simultaneous prompting in combination with computer-assisted instruction on the writing of students with autism (Pennington et al., 2010, 2012, 2014).

The purpose of this study was to extend the existing research on the effectiveness of simultaneous prompting and to further specify the effectiveness of the types of tasks and the type of disability. Specifically, we examined the effectiveness of a simultaneous prompting procedure including instructional feedback as non-targeted information in the specific academic field of text composition, focusing on fourth-grade students with LD. The hypothesis was that the intervention would increase the quality of students' stories.

2. Methods

2.1 Participants

2.1.1 Students

Initially, four students participated in the study. Parental permission was obtained prior to the experiment and subjects' names were changed to maintain confidentiality. The students attended fourth grade in a special educational school. In Germany, the diagnosis of LD is determined contingent on repeated serious school failure accompanied by an IQ score of 70-85. Students are tested by a professional as part of the regulations and enrollment process of the German special educational school system. According to intellectual assessment based on the German version of the Wechsler Intelligence Scale for Children (Petermann, 2017), all students fell into that category. In addition, the special education teacher recommended these students for the intervention based on their weak writing skills, their regular attendance over the previous three months, and their estimated motivation to take part in the intervention. As a final step in selecting the participants for this experiment, students were asked to produce a writing sample of 20–40 words as a free writing task with no support. The writing probes were scored for quantity and spelling with a minimum requirement of at least 70% of correct letter sequences. During the experiment, one student (Sophie) was dismissed due to excessive absences as she missed a third of the probes.

The following information was taken from the school records of the remaining three students.

The first participant was 10-year-old Lene. She was born to parents with German citizenship. Due to severe abuse and neglect, she was placed in a group home a year prior to the intervention. Her IQ was 83. The second student was 10-year-old Yusem. He and his parents fled Syria during the refugee crisis in 2015. Yusem lived at home. His IQ was 68. However, it can be assumed that his score would have been somewhat higher if it was not for the slight language barrier he experienced (thus, he was considered LD even though his IQ fell two points short of reaching criterion). The third participant was 11-year-old Lara. She was born to German parents. Lara was at increased risk for attention problems since she was a premature infant who experienced birth complications. Her IQ was measured at 70, but inattention may have contributed to her difficulty completing the assessment; therefore, this score may not accurately represent her intellectual abilities.

2.2 Instructors

Two 25-year-old female graduate university students of special education served as instructors. They had recently completed two courses on writing interventions for students with learning problems, including several practice sessions on response prompting. Moreover, they had teaching experience gained through several internships in different special educational schools.

2.3 Setting

The study took place in a resource classroom in a suburban special educational school located on the metropolitan fringes of a large city in Northrhine-Westfalia (Germany). The school enrolled about 200 students in grades 1 to 10. The socioeconomic status of the school, as estimated by the mean occupational status of the families of the students attending, was considered low. A little over 60% of the school population had a migration background with Arabic, Russian, and Turkish being the most common primary languages spoken at home. At the time of the study, everyday life in school was considerably affected by COVID-19 precautions. This included wearing masks, frequent ventilation, and partially remote teaching (with only half of the students in class at a time).

2.4 Measurement

A list of 50 simple story starters served as writing prompts (e.g., "A trip to the zoo," "A spooky Halloween party," "An adventure by the sea"). Each prompt was printed on a slip of paper and put into a little box. During measurements, each participant drew one of the writing prompts and was provided with pens and paper. The same

pool of prompts was used during the intervention, but no story starter was presented more than once to a student.

A writing rubric that addressed all key elements of a narrative according to Martin and Manno (1995) and Troia and Graham (2002) was used to rate the quality of the stories composed by the participants. Both instructors rated the writing probes independently on a 5-point Likert scale according to how well the participants depicted a certain aspect (ranging from "1 = very poor" to "5 = very good"). If a particular element was not mentioned, no points were awarded. The items were as follows: (1) "Quality of the description of the setting," (2) "Quality of the description of the problem," (3) "Quality of the description of the solution," (4) "Quality of the description of the consequences," and (5) "Quality of the description of emotions."

Both instructors independently assessed the skill level demonstrated in the narratives the same day they were written and subsequently compared their ratings. Any disagreements were discussed and resolved. Because the outcome of the evaluations had to be reported back to the students the following day, it was not possible to involve an independent rater at this point. However, reliability of the assessment was estimated after the training had ended (see below).

2.5 Experimental Design

A multiple-baseline-across-participants design (AB) was used to examine the effects of the intervention. This approach demonstrates experimental control by systematically introducing the treatment in a time-lagged manner (Gast & Ledford, 2010). We staggered the baseline measurements across participants with 3, 4, 5, and 6 sessions, for Lene, Yusem, Sophie, and Lara, respectively. The independent variable was the response prompting procedure, whereas the dependent variable was the quality of the texts written by the students. Baseline consisted of between three and six daily probes. Duration of the intervention ranged between 9 and 12 days.

2.6 Procedures

2.6.1 Instructor Training

The third author provided procedural training to the instructors during three 30-minute sessions via video conference. It included an overview of the simultaneous prompting intervention and a demonstration of the different steps of the training. To help instructors implement the procedures with as much fidelity as possible, he also provided a standard 4-page script in which the treatment was outlined in a step-by-step manner. In addition, the third author taught the instructors to score writing probes using anchor essays written by different students during previous studies. That is, he presented the instructors with essays that he considered very well written for fourth graders with LD and went through the different categories of the rubric, explaining why he would award a high number of points for a particular feature in a given story. Subsequently, he repeated the procedure with text products that he deemed of mediocre and low quality. Following, the instructors independently rated six different texts of varying skill levels and lengths. The third author discussed the results with them and gave them feedback on how appropriate he thought their appraisals were.

2.6.2 Baseline

During baseline, each student met alternately with one of the instructors for 30 minutes every day in a resource room of the school, which was equipped with guided reading and math toolkits for lower-level students. The time of the day each child met with which instructor was determined by chance. To control for possible attention effects and to replace instruction during baseline with a non-writing-related activity, the first 20 minutes of each session were spent playing a card game. Data were collected at the end of each lesson, when the students were asked to write a story in response to a randomly drawn prompt (see above). There were no time limits for composing a text. However, the students finished their stories in less than 5 minutes.

2.6.3 Intervention

Treatment conditions resembled those during baseline with two exceptions: (a) Each session started with a 3- to 5-minute evaluation of the story that the students had composed the day before. With the help of the rating scale, the interventionists went through the different parts of each narrative and gave feedback on the strengths and weaknesses of the writing product. (b) Instead of playing a card game, the instructors involved the participants in a response prompting procedure that was in large part analogous to the one utilized in the Hudson et al. (2013) experiment. Thus, each session began with an evaluation of the previous writing product, continued with about 20 minutes of training, and finished with approximately 5 minutes of measuring performance, paralleling baseline.

In the first lesson, the instructors set the goal for the intervention by announcing "Today, you will learn how to start a story." They then presented a randomly drawn writing prompt from the pool of story starters to the students and continued the treatment by saying: "I will show you the first step in writing a story." Immediately after that (0-s

delay), the instructors provided a model sentence (like the one in Table 1) that they wrote on a blank piece of paper, accompanied by the explanation: "First of all, you need to provide a general frame for your story (who, where, and when). I am going to show you a topic sentence." A verbal prompt followed that included non-targeted information (e.g., "It is important to come up with a creative setting"). Next, the instructors asked the participants to write an opening sentence about the same writing prompt. If the participants started writing within 5 s and finished the sentence within 2 min, they were praised for their accomplishments. It did not matter whether they just copied the words or came up with a different solution. If they did not demonstrate the targeted behavior, they were corrected ("No, this is not a proper starting sentence") and the procedure (explanation plus modeling) was repeated before the children were asked again to compose a starting sentence. Once the participants delivered the desired response, the instructors went on to the next step (see Table 1) in a similar matter until the time was up.

Table 1. Task analysis of story writing with non-targeted information

Steps	Prompts	Training directions	Non-targeted information
Create a setting (when, where, who)	"Show me the first step in writing a story."	"First of all, you need to provide a general frame for your story (who, where, and when). I am going to show you a starting sentence (e.g., Not too long ago, there was an old woman who lived with her cat in a tiny house)."	"It is important to come up with a creative setting."
Introduce a problem	"Show what comes next in writing a story."	"Next, you need to explain something that happened in your story. I am going to show you a sentence that includes a problem (e.g., Because the woman fed the cat so much, it grew too big to sleep besides her in her bed)."	"Remember to begin your sentence with a capital letter."
Think of a solution	"Show what comes next in writing a story."	"Next, you need to relate how what happened ended up happening. I am going to show you a sentence that provides a solution (e.g., "The woman decided to sleep on the floor and let the cat sleep in her bed)."	"Remember to place the correct punctuation mark at the end of the sentence."
Describe the consequences	"Show what comes next in writing a story."	"Next, you need to wrap up your plot and conclude it. I am going to show you a sentence that finishes a storyline (e.g., The cat was happy, but the woman thought that she should not have fed the cat so much)."	"Describing how people feel makes your story more interesting."
Proofreading	"Show me the last step in writing a story."	"This is how you proofread your story. I am going to read my text aloud and check for mistakes."	"Reading your story aloud is a good way to proofread."

The second lesson started with the steps that were not covered in Session 1. Once a story was finished, the instructors guided the students through finding and correcting mistakes in the text. They stated: "I will show you how to proofread a story." Immediately afterwards (0-s delay), they read their model text aloud, checked for errors in spelling and grammar, and explained: "Reading your story aloud is a good way to proofread." Subsequently, the instructors prompted the students by saying: "Show me the last step in writing a story." If the students began proofreading within 5 s and finished within 2 min, the instructors gave positive feedback. If the targeted task was not performed by the students, the prompting procedure was repeated.

During the third and all following sessions, the instructors practiced composing stories with the students, each time using different randomly drawn writing prompts. After participants were able to complete the routine three times in a row without making a mistake and within the given time frame, the instructors limited themselves to only indicating the prompts in Table 1 ("Show me the first step in writing a story," "Show me what comes next in writing a story," "Show me the last step in writing a story"). Whenever a student got stuck or made a mistake, the instructors provided guided feedback. Towards the end of the intervention, the instructors encouraged the participants to embellish their narratives by writing more sentences and including more adjectives. While doing that, they gradually faded their support.

2.7 Reliability

A female special educator with over 10 years' teaching experience was present for 18 (50%) of the 36 training sessions (12 for Lene, 11 for Yusem, and 9 for Lara) to assess procedural reliability. During each observation, she marked a checklist that was based on the manual to which the two graduate university students adhered as they worked with the students. The procedural reliability was rated at 100%.

After every story was graded by the two instructors, a male paraprofessional rated three randomly selected texts (23.08%) composed during baseline conditions and seven randomly selected texts (21.88%) composed during treatment conditions. This rater had no previous knowledge about the study but had been briefed by the third author on the use of the rubric during a one-hour training session. For the interrater reliability, Spearman's rank correlation for total scores across both conditions was 0.93.

2.8 Social Validity

Upon conclusion of the study, the two instructors met with each student individually to solicit their perspectives on the intervention. They thanked the children for their participation and asked them to fill out a social validity scale consisting of seven items ("Did you enjoy writing the stories?," "Did the instruction help you write better stories?," "Do you think you can write better stories now than before the training?," "Do you enjoy writing stories now more than before the training?," "How did you like the feedback at the beginning of each session?," "Would you recommend the training to your friends?"). For each question, the participants had the option of choosing between a happy, neutral, and sad smiley image.

3. Results

The "Scan" package by Wilbert (2020) for the statistics program "R" was used to evaluate the descriptive data as well as the overlap indices and regression analyses. Additionally, the mean baseline difference (MBD) was calculated manually (O'Brien & Repp, 1990).

First, the three students wrote considerably longer stories during the intervention than during baseline. On average, Lene produced 30.67 (SD = 6.11), Yusem produced 23.75 (SD = 5.85), and Lara produced 57.83 (SD = 16.20) words before the treatment started. By comparison, while the treatment was implemented, Lene wrote a mean number of 68.25 (SD = 29.88), Yusem wrote 51.18 (SD = 17.26), and Lara wrote 115.56 (SD = 32.01) words. That is, the text length from baseline to intervention increased by 122.53%, 115.49%, and 99.83% for Lene, Yusem, and Lara, respectively.

As illustrated in Figure 1, Lene showed a negative trend in the baseline but a direct increase in performance upon the onset of the intervention. After the initial increase, a downward trend can be observed again, before data eventually increased rapidly and steeply. Yusem initially showed a drop in data in Phase A, before the values stabilized with a slight positive trend. Here, again, a level effect is visible as the intervention set in, and overall a gradual increase with a smaller drop in data at the end. Finally, up to the first measurement point Lara showed a very stable baseline with a level effect from Phase A to Phase B. In Phase B the data increased steadily. Only at measurement times 11 and 12 a drop in the data is visible before it rises again. All in all, there was a steady increase in data in Phase B for all three participants.

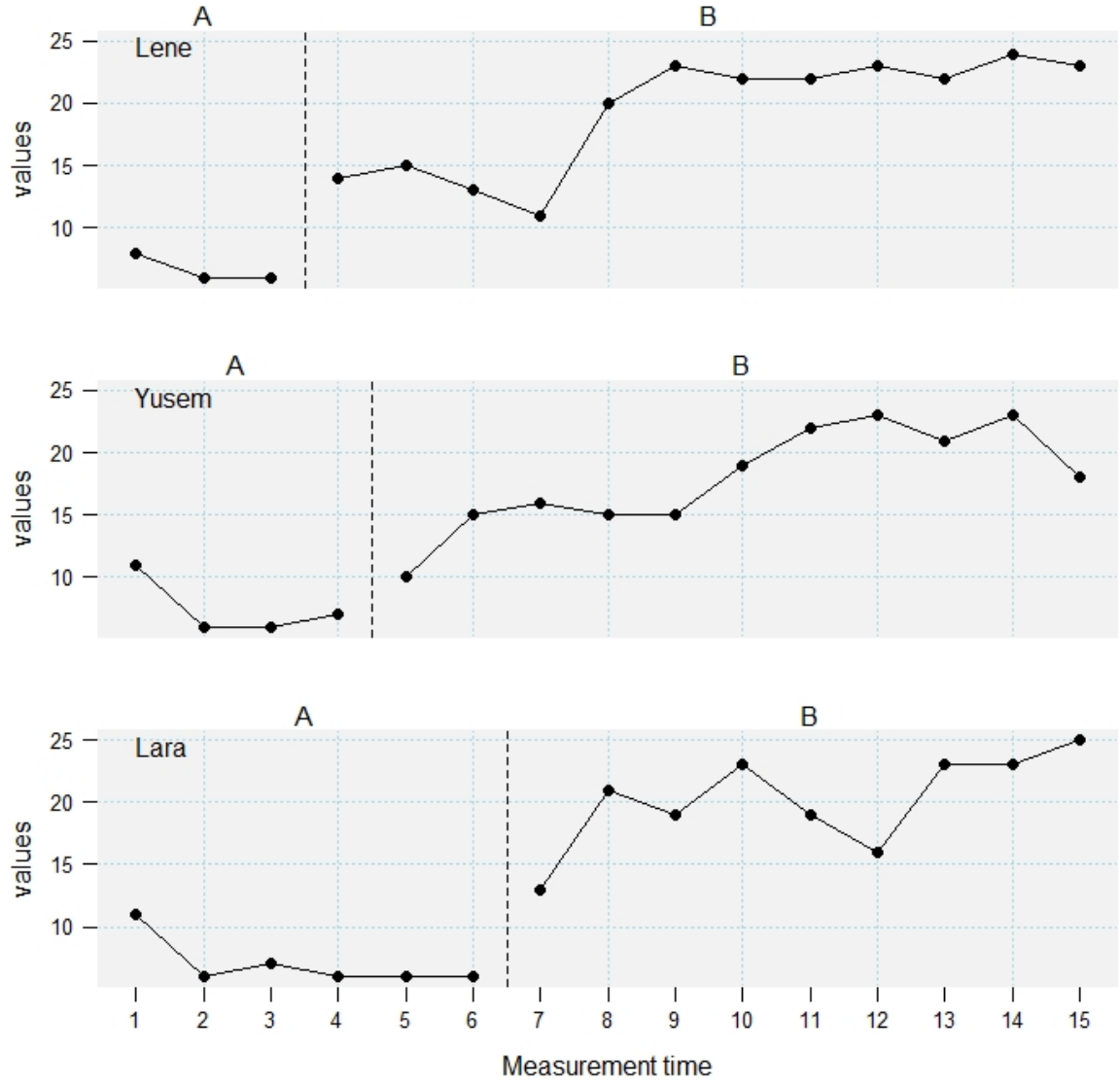

Figure 1. Data for the writing scores in phase A and B for all participants

The descriptive data (Table 2) show an increase of 189.81% from Phase A to Phase B for Lene and a maximum achieved value of 24.00 in the intervention phase. Yusem displayed an increase of 138.80% and a maximum value of 23.00 in Phase B, while Lara had a maximum value of 25.00 and an increase of 188.86%.

Table 2. Descriptive data for the dependent variable across all participants

	N (A)	N (B)	M (A) (*SD*)	M (B) (*SD*)	Max (B)	MBD
Lene	3	12	6.67(1.15)	19.33(4.68)	24.00	189.81%
Yusem	4	11	7.50(2.38)	17.91(4.13)	23.00	138.80%
Lara	6	9	7.00(2.00)	20.22(3.87)	25.00	188.86%

Note. N = number of measurement times; A = baseline; B = intervention; M = mean; SD = standard deviation; Max = maximum value in Phase B; MBD = mean baseline difference.

Additionally, overlap indices (Table 3) were calculated to obtain further information about the effectiveness beyond the descriptive analysis. For this purpose, the non-overlap of all pairs (NAP; Parker et al., 2011), the

percentage of non-overlapping data (PND; Scruggs et al., 1987), and Tau-U (Parker et al., 2011) were used. The *p*-value for the PND was calculated according to Tarlow and Penland (2016). For Tau-U, we applied the calculation formula that takes an A Phase trend into account (A vs. B + trend$_B$ – trend$_A$). For the NAP, strong and significant effect sizes were identified (p<.01) across all students. The same goes for the PND. Regarding Tau-U, all students displayed a large change: Lene (0.74, p<.001), Yusem (0.72, p<.01), and Lara (0.75, p<.001).

Table 3. Overlap indices for the dependent variable across all participants

Name	NAP	*p*	PND	*p*	Tau-U	*p*
Lene	100.00	<.01	100.00	<.01	0.74	<.001
Yusem	98.00	<.01	90.91	<.01	0.72	<.01
Lara	100.00	<.01	100.00	<.01	0.75	<.001

Note. NAP = non-overlap of all pairs; PND = percentage of non-overlapping data.

To complete the visual and quantitative analysis, a regression model (Table 4) was calculated per child and across all participants (Level 1 and Level 2 analysis). Lene and Yusem show statistically significant level effects (p<.05) with beta coefficients of 6.67 (Lene) and 6.207 (Yusem). Lara's data revealed a significant level (p<.01) and slope effect (p<.05) from Phase A to Phase B. Her performance increased by 1.66 scale points per intervention session. Level 2 analysis indicates no overall trend in Phase A. There was a statistically significant level effect (p<.001) and a statistically significant slope effect (p<.05), with an average increase of 0.73 scale points per intervention session.

Table 4. Regression model for dependent variable across all participants (Level 1 and Level 2 analysis)

	B	SE	*t*	*p*
		Lene		
Intercept	8.67	4.00	2.17	.05
Trend	-1.00	1.85	-0.50	.60
Level	6.67	2.88	2.31	<.05
Slope	2.08	1.87	1.11	.29
		Yusem		
Intercept	10.50	3.11	3.38	<.01
Trend	-1.20	1.13	-1.06	.31
Level	6.21	2.68	2.32	<.05
Slope	2.20	1.16	1.90	.08
		Lara		
Intercept	9.60	2.50	3.84	<01
Trend	-0.74	0.64	-1.16	.27
Level	10.50	2.76	3.81	<.01
Slope	1.66	0.73	2.27	<.05
		Overall		
Intercept	6.373	1.165	5.469	<.001
Trend	0.246	0.314	0.784	.44
Level	5.939	1.369	4.338	<.001
Slope	0.728	0.328	2.219	<.05

Finally, all three students completed a social validity questionnaire. Responses showed that they enjoyed writing the stories, found the instruction helpful, viewed their writing skills as being better than before the intervention, and would recommend the training to their friends. Lene gave a neutral response to the question of whether she liked the feedback at the beginning of each session. However, the two other children found it helpful to receive a response to their texts.

4. Discussion

4.1 Main Findings and Implications

Results from data collected during the intervention show that the simultaneous prompting procedure with

non-targeted information was effective in teaching composition to all three students. The visual analysis revealed a direct increase at the onset of the intervention for all participants. Interesting, the visual analysis also indicates phases during the intervention where the data show a decline that is followed by an increase in writing quality. This may be linked to external reasons like the writing prompt, low motivation, the time of day when the intervention took place, or other factors related to the setting.

In summary, all participants showed a steady increase in the quality of their writing throughout the intervention phase, with mean gains ranging from 99.83 % to 122.53% between Phase A and Phase B. Overlap indices (NAP, PND, Tau-U) further demonstrate that the intervention was highly effective with statistically significant results for all students.

The results of this single-case analysis add to the growing body of research on strategies that can help students with LD to improve their writing (Cook & Bennett, 2014; Gillespie Rouse & Sandoval., 2018; Kaldenberg et al., 2016). The findings are also consistent with those of other research linked to teaching chained academic tasks to students with disabilities using the simultaneous prompting procedure (Hudson et al., 2013; Pennington et al., 2014; Tekin-Iftar et al., 2018). As such, they add to the limited body of research on the effectiveness of a simultaneous prompting procedure on the academic task of composition writing for students with LD. However, more research is needed with regard to specific types of tasks and specific disabilities to further validate its general effectiveness (Tekin-Iftar et al., 2018).

Observations in this study were consistent with the findings of MacArthur and Graham (1987), that struggling writers generally invest little time on planning activities. As a consequence, their stories tend to be short, incoherent, and often incomplete (Englert & Raphael, 1988; MacArthur & Graham, 1987). Furthermore, weak text production skills exert an additional strain on students' limited working memory and can negatively impact how well and how much they write (Graham et al., 2017). Hence, the step-by-step guidance and feedback provided by the simultaneous prompting procedure throughout the writing process may be able to support planning as well as generally reduce the cognitive load required to orchestrate the complexity of the writing process. Once teachers and students are trained in using this procedure, it can be applied to a variety of tasks, making it a particularly interesting and versatile tool for teachers. Additionally, students indicated that they enjoyed the intervention and found it useful in improving their writing. Thus, there is social validity to using this intervention with students with LD, at least for the participants in this study. This is a crucial factor, as strategies to increase engagement and motivation for writing can lead to improved writing productivity (e.g., Grünke, 2019).

4.2 Limitation and Future Research

The study is subject to certain limitations. First of all, it included data from only three participants. The study was conducted at one school, the participants were of similar age and educational background, and all of them attended the fourth grade. Therefore, it is not possible to generalize the findings to the cohort of all struggling writers or all students with LD. Further research with larger and more diverse groups would be beneficial for evaluating the promising effects of simultaneous prompting as a chained task intervention in the academic field of writing. Another limiting effect concerns the research design. Due to time constraints and difficulty conducting in-class interventions during the Covid pandemic, we did not collect any followup data. As a consequence, maintenance effects on writing outcomes were not observed. However, in other experiments, simultaneous prompting procedures were found to generate maintenance effects for writing-related tasks (Hudson et al., 2013; Pennington et al., 2010, 2012, 2014) as well as for both discrete and chained non-writing -elated tasks (Tekin-Iftar, 2018). In future studies, a collection of writing samples across participants prior to and following the intervention could be assessed to generate insights into possible generalization effects (Hudson et al., 2013).

Another factor limiting the results of this study is the complexity of assessing the quality of a text. Rubrics are currently the most common method used to assess the quality of writing probes over time (Grünke et al., 2019), but the risk of subjectivity can still limit the inference with a higher probability of low inter-rater reliability scores between assessors. For this reason, in the present study, two assessors scored the writing probes independently using an adapted writing rubric; in addition, a paraprofessional unfamiliar with the study rated three randomly selected texts produced during baseline and seven randomly selected writing probes produced during intervention, resulting in a percentage of agreement of 0.93 between assessors. An additional limiting factor with regard to the validity of the intervention is that both cognitive and motivational variables can support students in their writing progress (Graham et al., 2017). The study did not measure which method was responsible for the positive outcome and to what extent.

Finally, Pennington et al. (2014) used simultaneous prompting in combination with computer-assisted instruction (CAI) and found positive effects for story composition. It would be beneficial to conduct more research on how

CAI or technology-aided instruction and intervention (TAII) and simultaneous prompting procedures can be combined as a way to maximize both the positive effects computers can add to an intervention (Grünke, 2006) and the systematic instruction of a simultaneous prompting procedure.

4.3 Conclusions

Despite the above limitations, the simultaneous prompting procedure with non-targeted information was found to be effective for improving the quality of stories of three students with LD in the academic field of writing instruction. Thus, the results of this study offer insight into a previously unexplored area of writing with students with LD. The findings strongly point to simultaneous prompting with non-targeted information being a successful method of improving the quality of stories written by students with LD. More research is needed to further strengthen the evidence found in this experiment, taking into consideration the limitations mentioned above when replicating the study.

References

Albarran, S. A., & Sandbank, M. (2019). Teaching non-target information to children with disabilities: An examination of instructive feedback literature. *Journal of Behavioral Education, 28*, 107-140. https://doi.org/10.1007/s10864-018-9301-3

Applebee, A., & Langer, J. (2011). A snapshot of writing instruction in middle and high schools. *English Journal, 100*(6), 14-27.

Baker, S., Gersten, R., & Graham, S. (2003). Teaching expressive writing to students with learning disabilities: Research-based applications and examples. *Journal of Learning Disabilities, 36*, 109-123. https://doi.org/10.1177/002221940303600204

Birkan, B. (2005). Using simultaneous prompting for teaching various discrete tasks to students with mental retardation. *Education and Training in Developmental Disabilities, 40*(1), 68-79.

Cook, K. B., & Bennett, K. E. (2014). Writing interventions for high school students with disabilities: A review of single-case design studies. *Remedial and Special Education, 35*(6), 344-355. https://doi.org/10.1177/0741932514523140

Englert, C. S., & Raphael, T. E. (1988). Constructing well-formed prose: Process, structure, and metacognitive knowledge. *Exceptional Children, 54*(6)*,* 513-520. https://doi.org/10.1177/001440298805400604

Gast, D. L., & Ledford, J. R. (2010). Multiple baseline and multiple probe designs. In D. L. Gast (Ed.), *Single subject research methodology in behavioral sciences*. Routledge. https://doi.org/10.4324/9780203877937

Gibson, A. N., & Schuster, J. W. (1992). The use of simultaneous prompting for teaching expressive word recognition to preschool children. *Topics in Early Childhood Special Education, 12*(2), 247-267. https://doi.org/0.1177/027112149201200208

Gilbert, J., & Graham, S. (2010). Teaching writing to elementary students in grades 4 to 6: A national survey. *The Elementary School Journal, 110*(4), 494-518. https://doi.org/10.1086/651193

Gillespie Rouse, A., & Sandoval, A. (2018). Writing interventions for students with learning disabilities: Characteristics of recent research. *Learning Disabilities: A Multidisciplinary Journal, 23*(2), 1-17. https://doi.org/10.18666/LDMJ-2018-V23-I2-8990

Gillespie, A., & Graham, S. (2014). A meta-analysis of writing interventions for students with learning disabilities. *Exceptional Children, 80*(4), 454-473. https://doi.org/10.1177/0014402914527238

Gillespie, A., Graham, S., Kiuhara, S., & Hebert, M. (2014). High school teachers use of writing to support students' learning: A national survey. *Reading and Writing, 27*, 1043-1072. https://doi.org/10.1007/s11145-013-9494-8

Graham, S. (2006). Writing. In P. Alexander, & P. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 457-477). Erlbaum.

Graham, S., & Hall, T. E. (2016). Writing and writing difficulties from primary grades to college: Introduction to the special issue. *Learning Disability Quarterly, 39*(1), 3-4. https://doi.org/10.1177/0731948715592154

Graham, S., & Harris, K. R. (2009). Almost 30 years of writing research: Making sense of it all with the wrath of khan. *Learning Disabilities Research & Practice, 24*(2), 58-68. https://doi.org/10.1111/j.1540-5826.2009.01277.x

Graham, S., & Harris, K. R. (2011). Writing and students with disabilities. In J. Kauffman, & D. Hallahan (Eds.),

Handbook of special education (pp. 422-433). Routledge.

Graham, S., Collins, A. A., & Rigby-Wills, H. (2017). Writing characteristics of students with learning disabilities and typically achieving peers. *Exceptional Children, 83*(2), 199-218. https://doi.org/10.1177/0014402916664070

Graham, S., Harris, K. Kiuhara, S., & Fishman, E. (2017). The relationship among strategic writing behavior, writing motivation, and writing performance with young, developing writers. *The Elementary School Journal, 118*(1), 82-104. https://doi.org/10.1086/693009

Graham, S., MacArthur, C., & Schwartz, S. (1995). Effects of goal setting and procedural facilitation on the revising behavior and writing performance of students with writing and learning problems. *Journal of Educational Psychology, 87*(2), 230-240. https://doi.org/10.1037/0022-0663.87.2.230

Grönlund, Å., & Genlott, A. (2013). Improving literacy skills through learning reading by writing: The iWTR method presented and tested. *Computers & Education, 67*, 98-104. https://doi.org/67.10.1016/j.compedu.2013.03.007

Grünke, M. (2006). Zur Effektivität von Fördermethoden bei Kindern und Jugendlichen mit Lernstörungen: Eine Synopse vorliegender Metaanalysen [On the efficacy of intervention methods for children and adolescents with learning problems: A synopsis of available meta-analyses]. *Kindheit und Entwicklung, 15*, 239-254. https://doi.org/10.1026/0942-5403.15.4.239

Grünke, M. (2019). The effects of a motivational intervention on improving the writing productivity of students with learning disabilities. *International Education Studies, 12*, 36-44. https://doi.org/10.5539/ies.v12n3p36

Grünke, M., Nobel, K., & Bracht, J. (2019). Effects of the Stop and List strategy on the writing performance of struggling fourth graders. *Journal of Education and Learning, 8*(2), 1-13. https://doi.org/10.5539/jel.v8n2p1

Håland. A., Home, T. F., & McTigue, E. M. (2019). Writing in first grade: The quantity and quality of practices in Norwegian classrooms. *Early Childhood Education Journal, 47*, 63-74. https://doi.org/10.1007/s10643-018-0908-8

Harris, K. R., & Graham, S. (1996). *Making the writing process work: Strategies for composition and self-regulation*. Brookline.

Hayes, J. R. (1996). A new framework for understanding cognition and affect in writing. In M. Levy, & S. Ransdell (Eds.), *The science of writing: Theories, methods, individual differences, and applications* (pp. 1-27). Erlbaum.

Hayes, J. R., & Flower, L. S. (1980). Identifying the organization of writing processes. In L. W. Gregg, & E. R. Steinberg (Eds.), *Cognitive processes in writing* (pp. 3-30). Lawrence Erlbaum.

Hisgen, S., Barwasser, A., Wellmann, T., & Grünke, M. (2020). The effects of a multicomponent strategy instruction on the argumentative writing performance of low-achieving secondary students. *Learning Disabilities: A Contemporary Journal, 18*(1), 93-110.

Hsiang, T. P., Graham, S., & Wong, P. M. (2018). Teaching writing in grades 7-9 in urban schools in Chinese societies in Asia. *Reading Research Quarterly, 53*(4), 473-507.

Hudson, T. M., Hinkson-Lee, K., & Collins, B. (2013). Teaching paragraph composition to students with emotional/behavioral disorders using the simultaneous prompting procedure. *Journal of Behavioral Education, 22*, 139-156. https://doi.org/10.1007/s10864-012-9167-8

Kaldenberg, E. R., Ganzeveld, P., Hosp, J. L., & Rodgers, D. B. (2016). Common characteristics of writing interventions for students with learning disabilities: A synthesis of the literature. *Psychology in the Schools, 53*(9), 938-953. https://doi.org/10.1002/pits.21958

Kiuhara, S., Graham, S., & Hawken, L. (2009). Teaching writing to high school students: A national survey. *Journal of Educational Psychology, 101*(1), 136-160. https://doi.org/10.1037/a0013097

MacArthur, C. A., & Graham, S. (1987). Learning disabled students' composing under three methods of text production: Handwriting, word processing, and dictation. *Journal of Special Education, 21*(3), 22-42. https://doi.org/10.1177/002246698702100304

Martin, K. F., & Manno, C. (1995). Use of a check-off system to improve middle school students' story compositions. *Journal of Learning Disabilities, 28*, 139-150. https://doi.org/10.1177/002221949502800303

Morse, T. E., & Schuster, J. W. (2004). Simultaneous prompting: A review of the literature. *Education and*

Training in Developmental Disabilities, 39(2), 153-168.

O'Brien, S., & Repp, A. C. (1990). Reinforcement-based reductive procedures: A review of 20 years of their use with persons with severe or profound retardation. *Journal of the Association for Persons with Severe Handicaps, 15*(3), 148-159. https://doi.org/10.1177/154079699001500307

Parker, R. I., Vannest, K. J., & Davis, J. L. (2011). Effect size in single case research: A review of nine non-overlap techniques. *Behavior Modification, 35*(4), 302-322. https://doi.org/10.1177/0145445511399147

Pennington, R. C., Ault, M. J., Schuster, J. W., & Sanders, A. (2010). Using simultaneous prompting and computer-assisted instruction to teach story writing to students with autism. *Assistive Technology Outcomes and Benefits, 7*(1), 24-38.

Pennington, R. C., Collins, B. C., Stenhoff, D. M., Turner, K., & Gunselman, K. (2014). Using simultaneous prompting and computer-assisted instruction to teach narrative writing skills to students with autism. *Education and Training in Autism and Developmental Disabilities, 49*, 396-414.

Pennington, R. C., Stenhoff, D. M., Gibson, J., & Ballou, K. (2012). Using simultaneous prompting to teach computer-based story writing to a student with autism. *Education and Treatment of Children, 35*(3), 389-406. https://doi.org/10.1353/etc.2012.0022

Petermann, F. (2017). *Wechsler Intelligence Scale for Children (WISC-V)* (5th ed.). Hogrefe.

Rao, S., & Kane, M. T. (2009). Teaching students with cognitive impairment chained mathematical task of decimal subtraction using simultaneous prompting. *Education and Training in Developmental Disabilities, 44*(2), 244-256.

Rietdijk, S., van Weijen, D., Janssen, T., van den Bergh, H., & Rijlaarsdam, G. (2018). Teaching writing in primary education: Classroom practice, time, teachers' beliefs and skills. *Journal of Educational Psychology, 110*, 640-663. http://dx.doi.org/10.1037/edu0000237

Saddler, B., Ellis-Robinson, T., & Asaro-Saddler, K. (2018). Using sentence combining instruction to enhance the writing skills of children with learning disabilities. *Learning Disabilities: A Contemporary Journal, 16*(2), 191-201.

Scruggs, T. E., Mastropieri, M. A., & Casto, G. (1987). The quantitative synthesis of single-subject research: Methodology and validation. *Remedial and Special Education, 8*(2), 24-33. https://doi.org/10.1177/074193258700800206

Shapiro, E. S., Zigmond, N., Wallace, T., & Marston, D. (2011). *Implementing response to intervention: Tools, outcome, and implications*. Guilford.

Smith, B. R., Schuster, J. W., Collins, B., & Kleinert, H. (2011). Using simultaneous prompting to teach restaurant words and classifications as non-target information to secondary students with moderate to severe disabilities. *Education and Training in Autism and Developmental Disabilities, 46*(2), 251-266.

Tarlow, K. R., & Penland, A. (2016). Outcome assessment and inference with the percentage of non-overlapping data (PND) single-case statistic. *Practice Innovations, 1*(4), 221-233. https://doi.org/10.1037/pri0000029

Tekin-Iftar, E., Olçay, S., & Collins, B. (2018). Descriptive analysis and meta analysis of studies investigating of simultaneous prompting procedure. *Exceptional Children, 85*(3), 309-328. https://doi.org/10.1177/0014402918795702

Troia, G. A., & Graham, S. (2002). The effectiveness of a highly explicit, teacher-directed strategy instruction routine: Changing the writing performance of students with learning disabilities. *Journal of Learning Disabilities, 35*, 290-305. https://doi.org/10.1177/00222194020350040101

Waugh, R., Alberto, P., & Fredrick, L. (2011). Simultaneous prompting: An instructional strategy for skill acquisition. *Education and Training in Autism and Developmental Disabilities, 46*(4), 528-543.

Werts, M. G., Wolery, M., Holcombe, A., & Gast, D. L. (1995). Instructive feedback: Review of parameters and effects. *Journal of Behavioral Education, 5*(1), 55-75. https://doi.org/10.1007/BF02110214

Wijekumar, K., Beerwinkle, A. L., Harris, K. R., & Graham, S. (2019). Etiology of teacher knowledge and instructional skills for literacy at the upper elementary grades. *Annals of Dyslexia, 69*, 5-20. https://doi.org/10.1007/s11881-018-00170-6

Wilbert, J. (2020). *Package "Scan."* Retrieved from https://www.uni-potsdam.de/fileadmin01/projects/inklusion/scan/scan.pdf