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The Effects of a Peer-Tutoring Intervention on the Text Production of Students With Learning and Speech Problems: A Case Report

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The purpose of this single-case study was to evaluate the effects of a peer-tutoring intervention on the text production skills of three third graders with severe learning and speech difficulties. All tutees were initially able to produce only very short stories. During the course of the treatment, higher performing classmates taught them how to apply a graphic organizing strategy (story mapping) to help them plan their texts more systematically. The intervention, which was comprised of between five and seven 45-minute sessions, led to dramatic increases in the number of words that the tutees wrote while producing short stories. Study results provide clear evidence of the effectiveness of teaching students with learning and speech disabilities the use of story maps through peer tutoring. The article ends with a discussion of the limitations of the study as well as suggestions for future research.

Keywords: **Writing difficulties, text production, story mapping, peer tutoring, learning disabilities, speech difficulties.**

Introduction

The ability to compose reasonable texts is an advanced skill that is essential for a successful school and occupational career (Kellogg & Raulerson, 2007). A lot of human communication takes place through writing (e.g., producing a shopping list, a text on an instant messenger, or a résumé cover letter). Through writing, we are able to express and reflect our content knowledge, intellectual flexibility, and maturity (Rodríguez, Grünke, González-Castro, García, & Álvarez-García, 2015). If we specifically focus on school history, the skill of producing meaningful texts is one of the most significant prerequisites for successfully making it through graduation. Thus, academic success not only depends on solid content knowledge or reasoning skills, it also depends very heavily on the ability to effectively put one's thoughts and ideas on paper (see, e.g., MacArthur, Graham, & Fitzgerald, 2008).

However, the findings of a number of large surveys have demonstrated that a considerable percentage of children and youth are unable to compose texts of an acceptable quality. Among students who manifest a disorder, the problem is even more significant. Thus, only 6% of 8th graders and 5% of 12th graders perform above the basic writing proficiency level (Salahu-Din, Persky, & Miller, 2008). Students most at risk for failure include students with learning disabilities (LD) (Grünke & Leonard-Zabel, 2015), who "… fail to develop the knowledge, skill, will, and self-regulation necessary to succeed in key subject areas. Oftentimes, they leave school without any

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kind of certificate and end up in danger of spending a lifetime in precarious employment relationships or dependent on social welfare benefits" (Grünke & Morrison Cavendish, 2016, p. 1). Another group of students who are especially susceptible to developing severe writing problems are students with speech, language, and communication difficulties (SLCD) (Arfé, Dockrell, & Berninger, 2014) – defined as disorders of language, articulation, fluency, or voice that interfere with communication, pre-academic or academic learning, vocational training, or social adjustment (Kaderavek, 2014). Further, comorbidities between LD and SLCD are not uncommon. For example, Margari and colleagues (2013) found that more than every 10th student with LD also met the diagnostic criteria for SLCD.

A groundbreaking model proposed by Hayes and Flower (1980) divides the writing process into three stages: prewriting, writing and rewriting. Within this model, the subtask that poses challenges for many children and youth with LD and SLCD is the first one: prewriting. Compared to average performers, these students spend very little time thinking about the content of the text that they are about to compose (Rodríguez et al., 2015). For them, creating a writing product is a knowledge-telling process in which they instantly jot down anything that comes to mind. Each thought just prompts the next one (Graham, 2010). Thus, they generally submit strikingly brief texts poor of content (Re, Pedron, & Cornoldi, 2007).

Research has shown that the number of words in stories composed by students during an early stage of their writing development (usually third grade) greatly determines the quality of a narrative as rated by experts. In simpler terms, the longer a text is, the more likely it is to be deemed of high quality (Grünke, Büyüknarci, Wilbert, & Breuer, 2015). However, what applies to stories written by children during a certain developmental phase is not necessarily true for other kinds of genres and other populations of different ages. But for students with LD and SLCD – as well as other students who also struggle with text production and demonstrate especially serious problems during the first stage of the writing process of Hayes and Flowers' model (1980) – approaches to help them increase the length of their texts are should be given serious consideration.

Fortunately, according to several meta-analyses (Cook & Bennett, 2014; Gillespie & Graham, 2014; Rogers & Graham, 2008), various prewriting interventions designed to foster planning abilities in children and youth result in texts of considerably increased length. According to Grünke and Leonard-Zabel (2015), story mapping, which uses a flowchart (story map) to help students outline the course of a narrative, is an especially promising option in this respect. Thus, a number of experiments have demonstrated its effectiveness with different kinds of struggling writers (e.g., Hennes, Büyüknarci, Rietz, & Grünke, 2015; Li, 2007; Unzueta & Barbetta, 2012; Zipprich, 1995). But even though the results of existing studies are promising, many educators view writing as such a sophisticated skill that they shy away from explicitly teaching it, instead limiting literacy instruction to teaching reading and spelling (Troia & Graham, 2003).

One way to help educators attend to the specific needs of each individual learner in a diverse classroom, and thus to better manage the demanding task of supporting writing skills in struggling students, is peer tutoring. This strategy involves children or youth serving as academic tutors and tutees, respectively. Usually,

a teacher pairs a higher performing student with a lower performing classmate to review critical academic concepts. As such, peer tutoring provides opportunities for intensive interaction, ample practice, and constant feedback (Bond-Brooks & Castagnera, 2010).

The purpose of the present study was to determine whether story mapping can be effectively applied in a peer-tutoring context to foster text production of learners who are especially at risk for failing in school and life due to poor writing skills – students with LD and SLCD. Our experiment, which may be considered a pilot study, was conducted using single-case analysis. We chose third graders as participants, because during this phase of education, students are expected to acquire the basic composition skills (Fayol, Alamargot, & Berninger, 2012).

Method

Participants and Setting

Three students, one female und two males, from a third-grade class in a special school for speech therapy served as the tutees. The school is located in a major city in Northrhein-Westfalia (Germany). We identified suitable candidates for the study by administering to the whole class a subtest from the General German Language Test (GGLT; Steinert, 2011), in which participants had to produce a narrative in response to a writing prompt. The prompt consisted of a picture showing a man climbing up a ladder to a balcony and a woman watching him from a window in a neighboring house. There was no time limit for completing the task.

We selected the three children who produced texts with the fewest number of words and consulted their classroom teacher to inquire about their spelling proficiency. She assured us that all three students possessed average orthographic skills but demonstrated only rudimentary composition writing abilities. The three tutees, Anna, Kevin, and Phil (names changed for anonymity), were 10;9, 11;1 and 10;9 years old, respectively. Their tutor counterparts (one girl and two boys) fell into the same age group and consisted of the three children who wrote the highest number of words during our classwide screening. The high-performing girl was matched with the low-performing girl. We assigned the two male tutors to the two male tutees based on their teacher's recommendation about got along best with whom.

As indicated, both the tutees and the tutors attended a special school for speech therapy. Accordingly, all of them demonstrated noticeable difficulties with the production of sounds. Before their enrollment in the special school, they were identified by a multiprofessional team as having special educational needs in language development. None of the students came from immigrant backgrounds. In addition to their speech disorders, the three tutees showed severe problems in all core school subjects and – according to their teacher – met all the criteria for the concept of an LD as commonly adopted in Germany, the United Kingdom, Ireland, and some other countries (see Gates & Mafuba, 2016; Grünke & Morrison Cavendish, 2016).

Response Measures

As writing prompts, we used a list of 40 essay subjects from a book by Hirmer and Hirmer (2007). The tutees were presented with two randomly drawn topics

written on slips of paper at each measuring point (see below) and asked to write a story about one of them (e.g., "An unexpected visitor," "It was all my fault," or "What goes around, comes around"). The students were provided with paper and told they could take as much time as they liked to produce their texts.

As a progress-monitoring target, we used total words written (TWW) – the quickest and most common method for evaluating writing interventions (Gansle, Noell, VanDerHeyden, Naquin, & Slider, 2002). TWW is defined as the number of recognizable words written regardless of spelling or context (excluding digits). A "word" is defined as any letter or group of letters that has a space before and after it (even if it is misspelled or must be viewed as a nonsense word) (see Hosp, Hosp, & Howell, 2016). The second author determined TWW by underlining each word and recording the total number of each text. Because research has shown that TWW is a very reliable tool for measuring written expression (Fuchs & Fuchs, 2011), we did not need a second scorer.

Experimental Design and Data Analysis

A multiple-baseline design (AB) across subjects (Horner & Odom, 2014) was employed to evaluate the effects of our training. We collected 10 writing samples from each tutee over the course of a two-week period. During this phase, they produced one story at a time at the end of each school day. In line with the standards for single-case studies proposed by Tate et al. (2016), we determined the beginning of the intervention for each tutee randomly while adhering to the requirement that baseline and intervention phases were to last for at least three days. Consequently, the treatment could begin any time after the 3rd, 4th, 5th, 6th, or 7th baseline probe. As a result of the random drawing of the intervention starting points, Anna and her tutor launched their training after the third day, Kevin and his tutor after the fourth day, and Phil and his tutor after the fifth day.

Our data analysis included a visual inspection of TWW (Kratochwill, Levin, Horner, & Swoboda, 2014), calculation of effect sizes measuring the average increase in performance from baseline for each tutee (mean baseline difference [MBD]; Campbell, 2003), and application of an inferential statistical test to determine the probability about the extent to which any phase differences could be explained by chance (randomization test; Dugard, 2013).

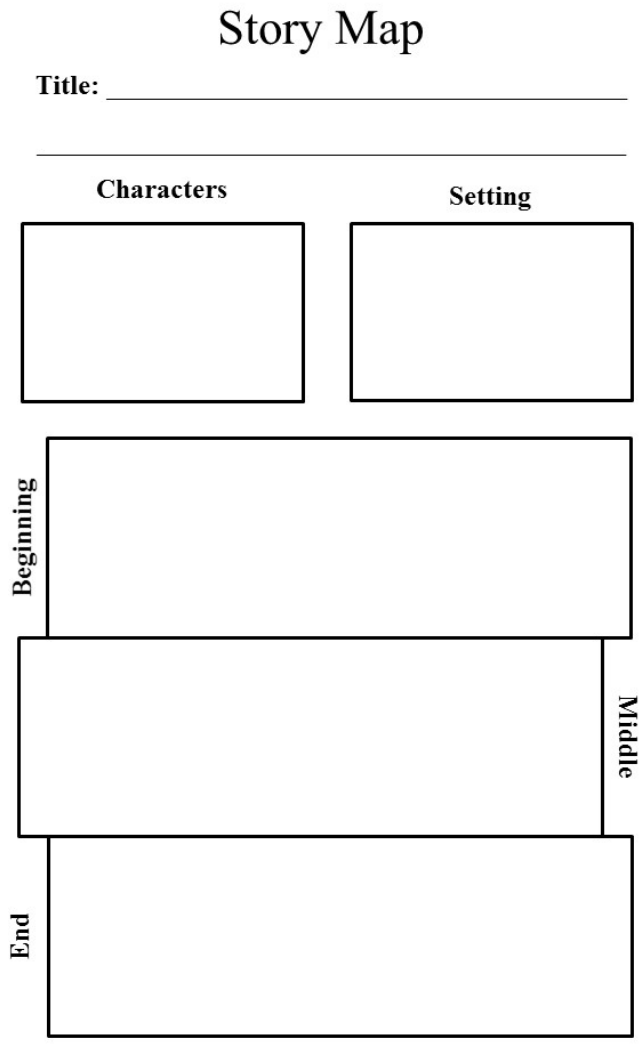
Intervention

The week before the intervention started, the three tutors received a two-hour briefing by the second author on how to implement the training along with a card summarizing the strategy. They were advised to follow the common scaffolding sequence for direct instruction of "I do it, we do it, you do it" (Archer & Hughes, 2010) as they tried to teach the tutees how to use story maps.

The intervention proceeded as follows: Each tutor worked with her or his tutee on an individual basis in a quiet area of the classroom for 45 minutes each day, while the rest of the students in the class were engaged in self-study. During an initial instruction phase (1st to 3rd training session), the tutors chose an essay subject from a list provided to them (similar to the one mentioned above by Hirmer & Hirmer, 2007). Subsequently, they brainstormed in front of the tutees about things they

could write concerning the given topic while thinking out loud and jotted down their thoughts in the appropriate field of a German version of a story map, as depicted in Figure 1. Finally, the tutees performed the same task, also while thinking out loud. Along the way, the tutors provided any support necessary to help the tutees come up with a collection of ideas and write them down in the designated fields (ask guided questions, give subliminal hints, offer corrective feedback, provide encouragement through verbal reinforcement for on-task behavior, etc.).

Figure 1. **A story map template for planning a story.**



During the following phase (from the fourth session onwards), the tutors and tutees started to compose short stories together, using story map templates as planning aids, with the tutors' guidance increasingly fading out. Thus, the tutees produced their texts gradually more and more independently. If they were not able to finish a narrative within the given timeframe, they either continued it the next day or briefly talked about what they would have written down if they had had more time. Throughout the process, the second author stayed in direct proximity to the students and provided support as necessary.

Procedural Fidelity

We tried to ensure faithful delivery of the intervention by providing a detailed script for tutors to follow. In addition, the second author monitored all peer tutoring sessions and offered support whenever necessary. Beyond that, we used no formal measure of adherence to our treatment guidelines.

Results

Table 1 shows the daily performance for each of the three tutees. As illustrated, the overall mean of TWW during the baseline was 32.67 with a range of 27.00-38.00; the overall mean during the intervention was 125.02 with a range of 123.80-136.83. Thus, on average, the performance of the three tutees increased by 382.68%.

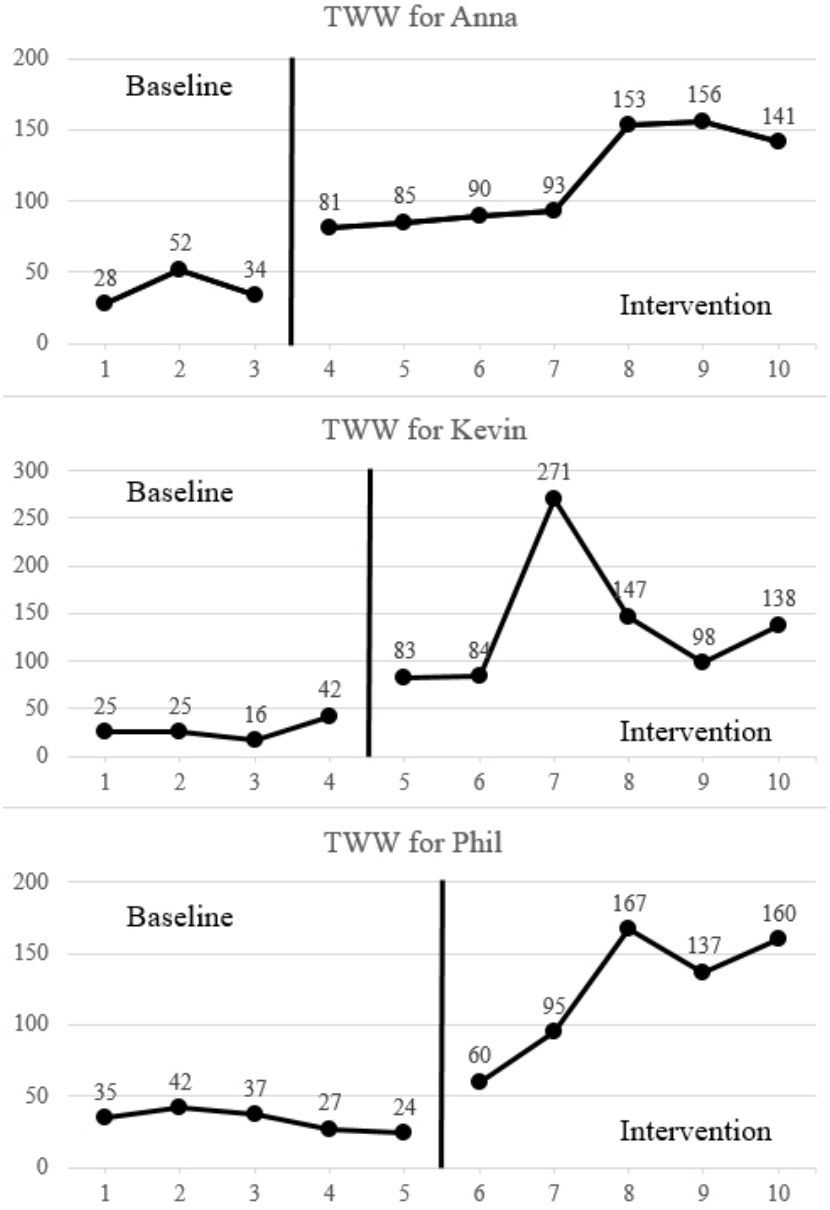
Table 1. ***TWW for Each Tutee***

		Baseline	Intervention
Anna	*N* (Probes)	3	7
	Raw Scores	28; 52; 34;	81; 85; 90; 93; 153; 156; 141;
	M	38.00	114.42
	Range	28-52	81-156
Kevin	*N* (Probes)	4	6
	Raw Scores	25; 25, 16; 42;	83; 84; 271; 147; 98; 138;
	M	27.00	136.83
	Range	16-42	83-271
Phil	*N* (Probes)	5	5
	Raw Scores	35; 42; 37; 27; 24;	60; 95; 167; 137; 160;
	M	33.00	123.80
	Range	24-37	60-167

Further, the data of all tutees revealed a stable baseline trend (see Figure 2). Upon the start of the intervention, Anna's performance showed a sudden jump and then increased slightly for the following four days. Then, another distinctive rise in TWW occurred. Kevin wrote about twice as many words during the first two days of his peer training than he did at his last baseline probe. Subsequently, he composed a story consisting of as many words as he had written during all six baseline and intervention probes together. At the end of the training, his performance dropped, but was still at an impressive level, between 98 and 147 TWW. Phil's data also revealed a stark increase in text production after the baseline condition, followed by a relatively

steady and steep upward trend. All in all, a visual inspection of the graphed TWW that the tutees handed in over the course of the study suggests that the intervention was highly effective.

Figure 2. **TWW for each tutee in baseline and the intervention phase.**



We used the MBD (Campbell, 2003) as an effect size to quantify the magnitude of the benefits that the peer training provided for the three struggling writers. MBD is calculated by subtracting the mean of the baseline points from the mean of the intervention points and then dividing the mean of the baseline points and multiplying the result by 100. For Anna, the MBD was (114.42 - 38.00)/38.00 x 100 = 201; for Kevin, it was (136.83 - 27.00)/27.00 x 100 = 407; and for Phil, it was (123.80 - 33.00)/33.00 x 100 = 275. Thus, the overall effect size, as calculated using MBD, was (201 + 407 + 275)/3 = 294. Such an outcome can be considered as very positive (ebd.).

Finally, we determined the statistical significance of the differences between baseline and intervention phase data using a randomization test, as described by Grünke, Boon, and Burke (2015). Since the start of the training was determined randomly for all three tutees within a certain range, we were able to apply this method in accordance with its requirements, using an IBM® SPSS macro (downloadable from https://tandfbis.s3.amazonaws.com/rt-media/pp/common/sample-chapters/9780415886932-spss.zip). In our case, the difference between the mean baseline and mean intervention phase data across the three tutees was statistically significant with an exact *p*-value of 0.031.

Discussion

This study adds to the growing literature on teaching students with disabilities to become more proficient writers. Our single-case analysis specifically aimed at investigating the effects of story mapping on the text production of third graders with LD and SLCD in a peer-tutoring context. The results clear show that the intervention yielded striking improvements in the text production of all three tutees. Upon the onset of the treatment, all of them significantly increased the number of words in the stories they wrote each day. All in all, the gains between baseline and intervention phase averaged almost 400%. Similarly, our effect size measures (MBD) strongly suggest large improvements over the treatment periods for all tutees. Finally, the inferential statistical analysis confirmed the former conclusions based on visual inspection and MBD.

Nevertheless, our findings are subject to certain limitations. First of all, the outcomes are of limited generalizability, as it would be impossible to draw far-reaching conclusions about teaching struggling students how to improve their text production skills based on the cases of just three third graders. Besides, the tutees belonged to a particular age group and demonstrated certain challenges with regard to general learning and speech abilities. Thus, any conclusions based on these results can refer only to this specific population. In addition, implications about the benefits of the treatment are restricted to the genre of short stories. Another limitation stems from the experimental design of the study. We applied a multiple-baseline plan (AB) across subjects and did not collect any follow-up data. Thus, it is not feasible to make claims about the long-term sustainability of the treatment effects.

Finally, as with many articles on LD published in international journals, specifying this kind of disability remains a tricky one. The understanding of LD around the globe is anything but consistent. In our case, we followed the definition common in Germany, Great Britain, Ireland, and a number of other countries, whereby LD characterizes individuals failing in all core school subjects but demonstrating

reasoning skills above the level of someone with a mild intellectual disability (see, e.g., Grünke & Morrison Cavendish, 2016). Our basis for classifying the three tutees as having LD was their performance at school, the appraisal of their classroom teacher, and the fact that they produced text with the fewest number of words during our initial screening. Using standardized tests for measuring intelligence and academic achievement would have enabled us to describe our participants more precisely.

Despite the shortcomings of our experiment, the findings are promising and give rise to the hope that incorporating peer tutoring into the general classroom routine, in this case to teach students with LD and SLCD the use of story maps, will increase the text production skills of these learners. Unlike many other intervention studies, our setting was not artificial. We as researchers took a back seat and only intervened with the training if it was unavoidable. The remedial teaching was done by fellow classmates, supporting the assumption that the findings regarding the benefits of our approach are transferable to everyday life at school. Further, the peer-tutorial intervention was very easy to implement and carry out, and this arrangement can provide opportunities for total participation by all students since each of them is either planning, writing, checking, or monitoring. In short, teaching the use of story maps through peer tutoring is a helpful and effective way to prevent students with LD and SLCD from falling behind in their text composition skills as they approach the end of their elementary education (viz. grade three).

Future research should focus on replicating the current findings and addressing the weaknesses of our experiment, as discussed above. In particular, prospective studies need to provide for the collection of follow-up data to allow for drawing conclusions about the sustainability of treatment effects. In addition, replications should include different samples of students across age ranges as well as different text genres. Furthermore, in addition to text productivity, future research should also consider text quality as part of capturing the benefits of writing interventions. Finally, studies should not limit their focus to learning gains for tutees but also investigate possible benefits for tutors.

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