The Effects of a Class-Wide Multicomponent Motivational Intervention on the Writing Performance of Academically Challenged Elementary School Students

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The present study was conducted to evaluate the effects of a simple multicomponent motivational intervention on the writing performance of a class of low-achieving fourth graders under everyday conditions in schools. An ABAB design was utilized to establish a functional relationship between the independent variable (a treatment involving explicit timing, immediate feedback through self-scoring, and positive reinforcement through verbal praise and the display of high scores) and the dependent variable (the total number of words written). The students took very well to the intervention and significantly increased their performance whenever it was carried out. Implications for future research and practice are discussed.

Keywords: **Learning Disabilities In Written Language, Writing Performance, Multicomponent Motivational System, Explicit Timing, Self-Scoring, Positive Reinforcement**

INTRODUCTION

The ability to compose texts is a key competence in today's society. On the one hand, this skill is one of the most important prerequisites to the ability to perform well in school. Completing written homework or taking a written exam is not possible without the ability to effectively put one's thoughts and ideas on paper or into a keyboard (e.g., MacArthur, Graham, & Fitzgerald, 2008; Graham & Perin, 2007). On the other hand, adequate writing skills can enhance expression and communication with others, which leads to higher social participation and improves one's chances of securing decent employment after graduating from school (Graham, 2008; Kellogg & Raulerson, 2007).

The majority of children acquire basic text production skills during their elementary education. This, with further development and practice, enables them to become advanced writers in higher grades. However, a considerable share of students do not clear this hurdle. According to Katusic, Colligan, Weaver, and Barbaresi (2009), up to 14.7% of all school-aged children and youth meet the criteria of a learning disability (LD) in written language.

Far more students severely struggle with text production without exhibiting this diagnosis (Blood, Mamett, Gordon, & Blood, 2010).

Students with an LD and those at risk for developing one have usually had frequent experiences of failure in writing, leaving them discouraged, unmotivated, and downtrodden. They feel overwhelmed and become more and more unwilling to engage in tasks where they need to transcribe their thoughts and ideas (Wehmeyer, Shogren, Toste, & Mahal, 2017). Of course, developing fears of writing impacts school careers in a negative way because composing skills are required in most every subject (Grünke & Leonard Zabel, 2015).

However, the resistance of these students is comprehensible as there is probably no other academic endeavor more challenging, arduous, and daunting for struggling learners than text production. It requires an array of different competencies, such as self-regulation skills, strategic behavior, writing skills, and writing knowledge (Berninger & Winn, 2006; Alexander, Graham, & Harris, 1998). Students need to process the mental capacity and cognitive flexibility to organize and formulate their own ideas while keeping their audience in mind and demonstrating their linguistic prowess through the mastery of handwriting, spelling, syntax, grammar, capitalization, and punctuation (Alevriadou & Giaouri, 2015).

Creating conditions in class that do not add to students' resistance toward text composition, but that instead embolden them to get involved in writing, is extremely vital. It is an urgent goal to encourage children who are at risk for permanent failure not to give up, but to try to engage in writing, even though their previous endeavors haven not been very heartening. Only then may further competencies such as self-regulation skills, strategic behavior, writing skills, or writing knowledge be tackled to promote the production of texts with increasing quality (Graham, 2008).

In the famous model by Hayes and Flower (1980), a so-called monitor controls the three basic writing processes of planning, translating, and reviewing. It functions as a strategist and determines when a learner moves from one activity to the next. As long as students are unable or unwilling to sink their teeth into a writing task and to stick to it for a while, the monitor cannot coordinate these processes and none of them will be executed for a time that is sufficiently long enough to create an acceptable text product (Fayol, Alamargot, & Berninger, 2012). Thus, first and foremost, it is essential for struggling students to get involved in writing before their resistance toward it becomes insurmountable.

Fortunately, there are a number of well-grounded interventions that can be used to effectively boost students' learning motivation in general, such as explicit timing, immediate feedback through self-scoring, and positive reinforcement through verbal praise and display of high scores (e.g., Leko, 2016;

Mercer, Mercer, & Pullen, 2011; Mitchell, 2014). When applying explicit timing, a teacher gives the students a certain task, informs them of the time interval to complete it, and monitors them as they try to be as effective as possible within the given timeframe (Van Houten & Thompson, 1976). Immediate feedback through self-scoring is a procedure in which learners monitor their own performance by counting whatever represents the relevant target variable (e.g., the number of words read, math problems solved, words written, etc.) at the end of an assignment (Light, McKeachie, & Lin, 1988). Generally, positive reinforcement is defined as the presentation of a stimulus contingent on a (wanted) behavior that results in an increased frequency of that behavior in the future (Skinner, 1953). In school settings, this technique is often put to use by outwardly expressing and encouraging students or prominently exhibiting their achievements (Archer & Hughes, 2011; Prater, 2018).

In a number of dated studies, all of these strategies have been successfully implemented to increase students' motivation to produce texts (Van Houten & McKillop, 1977; Van Houten, Hill, & Parsons, 1976; Van Houten, Morrison, Jarvis, & McDonald, 1974). Some more up to date experiments have focused on specific techniques like self-monitoring (Wolfe, Heron, & Goddard, 2000) or self-graphing (Stotz, Itoi, Konrad, & Alber-Morgan, 2008). However, the only recent published research paper that considered all aforementioned motivational methods is by Grünke, Sperling, and Burke (2017). In their experiment, they analyzed the effects of a multicomponent writing intervention that involved all of the aforementioned treatment elements (explicit timing, immediate feedback through self-scoring, and positive reinforcement through verbal praise and display of high scores). The results indicated that the intervention was remarkably effective.

However, most studies on the effects of the previously mentioned motivational components on writing performance or other school-related skills have been conducted with individual students in one-on-one settings, not with whole classes.

Therefore, the purpose of this study was to evaluate the benefits of a specific motivational support system that involved explicit timing, immediate feedback through self-scoring, and positive reinforcement through verbal praise and display of high scores on the writing performance of students with an LD or at risk for one in a whole-class setting in everyday school life. We focused on children in their last year of elementary education because, by this time, they should have acquired basic composition skills. If they are still behind in this respect, then long-term failure is almost inevitable.

<center>**METHOD**</center>

Participants and Setting

The participants of this study were 11 fourth graders (aged 10 to 11) attending an inclusive elementary school. It was located in an upper-middle socioeconomic suburb of a major city in Nothrhine-Westfalia (Germany) and served a population of around 200 children in grades one to four. In Germany, grade one constitutes the first school year and is equivalent to Kindergarten in the United States. The school offered special services for struggling students. However, due to an effort to avoid labeling, only a small fraction of them were officially diagnosed with a disability.

The class that our participants were a part of consisted of 16 students altogether. However, five of them were absent for three or more days while the experiment was conducted and were excluded from the study. The remaining 11 children had perfect attendance.

Four of the participants were female (Amy, Cora, Duru, Fara) and seven were male (Betal, Enis, Genti, Hank, Ilja, Jan, Kent). All names were changed for anonymity. Betal's parents came from India, Cora's and Ilja's from Russia, Duru's, Enis', and Kent's from Turkey, and Genti's from Albania. The rest of the children did not have an immigrant background. All participants were born in Germany and spoke German fluently. According to their main teacher, none of them could be considered a high achiever. All students experienced problems in learning and, consequently, faced academic failure. Their development in "basic psychological processes involved in understanding or using language, spoken or written" (Orosco, de Schonewise, de Onis, Klingner, & Hoover, 2008, p. 12) was delayed. Thus, most—if not all—of them could be considered as having a specific LD or being at risk for one (Grünke & Morrison Cavendish, 2016).

Interventionist

The intervention was implemented by the main teacher of the class. She was female and, at the time of the study, was 28 years old. Her qualifications included a bachelor's and a master's degree, as well as a licensure in elementary education. She had two years of teaching experience. In her spare time, she received additional university training in special education with the aim of becoming a licensed special education teacher.

Materials

All selected 20 story starters from a list of 55 writing prompts available under www.journalbuddies.com/journal_prompts__journal_topics/story-writing-prompts-for-kids/ (e.g., "A group of friends who win a trip to Italy," "A kid who becomes principal of the school," or "A dog with magic powers"). These prompts were first translated into German before we used them for our study. The teacher prepared an envelope for every participant with 20 paper tapes that

each had a writing prompt printed on them. At each measuring point, the children were given two pens of different colors (black and green) and three sheets of 8.5 x 11-inch notepaper. In addition, the teacher provided each child with a plastic folder that had a transparent pocket on its cover page.

The teacher also prepared an 8.5 x 11-inch chart in the form of a line plot for each student, depicting the number of words that the children produced during previous assignments. She kept a copy of the charts in case a participant lost it. Furthermore, a stack of ten 3 x 5-inch index cards that fit exactly into the pocket in the folder was provided for every student. Lastly, a time timer was utilized during the experiment.

Dependent Variables and Measurement

During the time of the study, the students randomly drew a strip for each day from their envelope. The teacher requested them to produce a story based on the respective prompt with the pens and the notepaper. Subsequently, she collected the paper tapes and threw them away.

We used the number of total words written (TWW) to capture the writing performance of the children. This common index is defined as the amount of recognizable words written, regardless of spelling or context (excluding digits; Hosp, Hosp, & Howell, 2016). TWW has been recommended for primary use in elementary schools and for optional use in secondary grade levels (Malecki, 2008). This index highly correlates with measures that are employed to determine the quality of stories written by fifth and sixth graders (Grünke, Büyüknarci, Wilbert, & Breuer, 2015).

A female research assistant (who was blind to the purpose of the study) kept score of the number of TWW. She attended to the texts in random order. To enhance reliability, she determined the number of TWW for each story one more time. In the rare case of a discrepancy, she conducted a third count. A fourth count was never necessary.

Experimental Design and Procedure

An ABAB plan was implemented to evaluate the effects of the intervention with five daily sessions in each phase. In this design, a baseline period (A1) is followed by a treatment phase (B1). To affirm any intervention effects, the treatment is then withdrawn (A2) and reapplied (B2; Riley-Tillman & Burns, 2009). An ABAB plan "provides a most convincing demonstration of causality available to applied researchers" (Gast & Hammond, 2009, p. 251). In addition, it is considered more ethical than an ABA design because the final condition involves administering the intervention to the participants rather than leaving them with no support (Jackson, 2011).

During baseline conditions (A1 and A2), the children were asked to produce a story in response to their respective writing prompt, place it within their plastic folder, and hand everything in to the teacher whenever they thought

they were ready. There were no time limits for finishing the task. Students received no feedback or encouragement. After completing their assignment, the children were asked to quietly engage in independent course work. On most days, students spent between five to ten minutes writing their stories. A limit of twelve minutes was never exceeded.

At the beginning of each B phase (B1 and B2), the teacher explained to the children that she now wanted them to try their very best when producing a narrative. She handed them their respective charts that illustrated the number of words they had written on previous days. Moreover, she inserted an index card into the pocket on the cover page of their folders that had the respective high score of each participant written on it. The teacher encouraged her students to produce a longer and better story than they had written in all of the previous days. She informed them that they had ten minutes to do so and that they would be monitored with a time timer. The visual timer was placed on the desk of the teacher for everyone to see.

After the 10-minute writing time was over, the participants were asked to take a pen of a color different from the one they had used to produce their texts and to count their words line by line, sum up the results, and enter the total on the top of their paper. Between each B phase session, the students' count was compared for accuracy with the research assistant's count. In all instances, the level of agreement equaled at least 90% (for the charts and for high score displays on the plastic folders, we used the results that the research assistant determined). Thus, the children were able to accurately determine their performance.

Above all, the teacher praised the students for their effort and especially for any increases in the number of TWW. Each verbal feedback included a statement that attributed decent work results to effort and poor results to variable factors (e.g., "a bad day"; see Robertson, 2000). In case a participant beat her or his personal record, the teacher prepared a new index card and inserted it into the pocket of the folder before the start of a new B phase session, now displaying the new high score.

Results

Table 1 presents descriptive statistics of the number of TWW that the 11 students produced. In almost all cases, the means in the B phases are higher than the means in the A phases. Only Betal achieved a higher average score in A2 than in B1. What is striking is the unusual high value of 117 that Fara reached in one writing task during the first baseline phase. Her other scores during A1 did not exceed 50. In fact, she only outperformed her score of 117 at the last measurement point of B2.

Table 1. Descriptive Statistics for TWW in Each Phase

Name	M				min				max				SD			
	A1	B1	A2	B2	A1	B1	A2	B2	A1	B1	A2	B2	A1	B1	A2	B2
Amy	41.60	121.20	72.40	148.60	12	109	60	124	65	137	86	160	21.81	13.27	11.08	14.31
Betal	83.60	152.80	154.80	193.60	74	124	113	160	94	195	184	216	7.57	27.09	26.30	21.31
Cora	112.00	200.40	166.20	296.40	83	135	138	216	134	238	200	354	20.59	44.38	25.64	50.44
Duru	42.80	142.60	88.00	150.00	18	97	40	108	64	189	138	181	19.52	34.80	46.54	26.79
Enis	14.00	50.40	18.00	43.20	4	30	12	28	26	75	31	53	7.97	18.66	7.65	9.28
Fara	52.40	77.20	53.60	103.00	24	53	23	62	117	90	73	133	37.87	15.16	20.59	26.83
Genti	40.40	62.00	48.80	86.20	27	37	28	56	58	83	79	114	11.67	16.73	20.10	21.68
Hank	45.80	83.80	58.80	101.40	34	69	45	85	60	101	73	124	11.45	13.26	10.64	14.88
Ilja	44.80	120.00	87.60	158.60	15	68	64	129	61	158	105	190	17.78	37.60	15.58	27.92
Jan	41.80	128.60	71.40	158.80	14	99	42	136	54	159	111	175	16.80	24.03	26.54	16.16
Kent	75.20	105.80	79.00	121.80	58	96	54	95	96	117	89	150	15.80	7.79	14.27	25.13

Figure 1 shows the average number of TWW in the different treatment conditions. The bar chart clearly indicates the overall effect of the intervention. From A1 to B1, performance increased by 109.40% and, from A2 to B2, there was a gain of 73.78%. The mean value subsided by 27.81% between the first intervention and the second baseline phase.
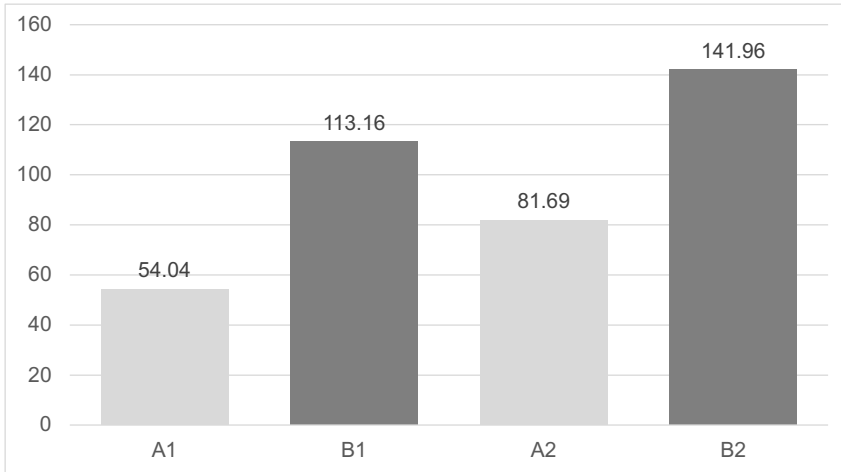

Figure 1. **Bar chart for the mean number of TWW for the four phases (light columns indicate A phases, dark columns indicate B phases).**

Bar charts based on averages do not contain any information on outliers. Furthermore, they do not account for any trends in the data that might occur during the course of a specific phase. Thus, a boxplot diagram was created (see Figure 2). A visual inspection of Figure 2 supports the conclusion that Figure 1 insinuates: The intervention obviously had an impact on the number of TWW that the students produced. Moreover, it can be stated that the first baseline phase was fairly stable and that student performance increased gradually during the first intervention phase. Just as in B1, a gradual progress in performance can also be detected in B2. However, the trend in A2 appears to be slightly less stable than in
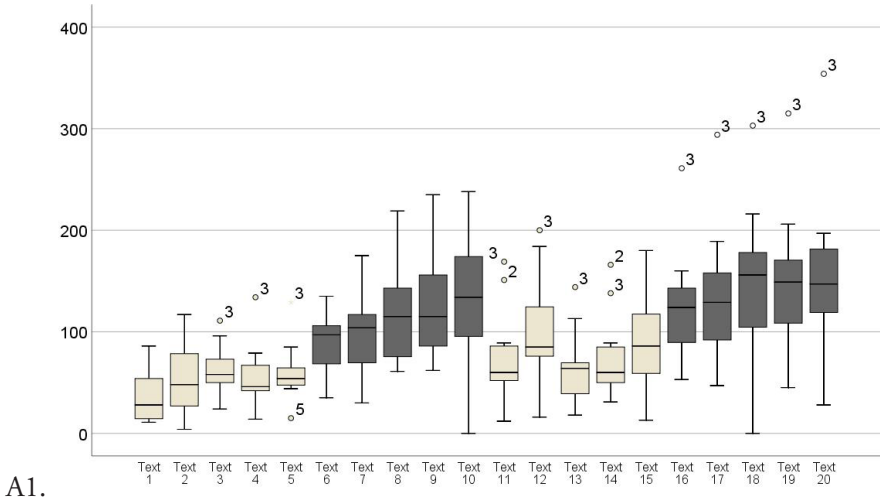
A1.

Figure 2. **Box plot for the number of TWW during each probe (light boxes indicate A phases, dark boxes indicate B phases)**

There are a number of outliers: Enis (participant 5) wrote a remarkably short story at the end of the first baseline phase. Betal (participant 2) produced two noticeably long texts during A2. However, the most striking results stem from Cora (participant 3). In 12 of 15 cases, she demonstrated a performance that did not fall in the inner fences of the T-bars. Cora was conspicuously efficient in her endeavors to write long stories. Whereas only Betal managed to produce texts of more than 200 words twice, Cora cleared this bar nine times. The last three stories that she wrote in B2 consisted of more than 300 words.

All following statistical analyses were carried out with the SCAN package for R by Wilbert and Lüke (2016). In Table 2, some of the most common non-overlapping indices are reported: percent of non-overlapping data (PND), percent of all non-overlapping data (PAND), percent of data points exceeding the median (PEM), and non-overlap of all pairs (NAP; see Parker, Vannest, & Davis, 2014). For the analysis, the two A phases and the two B phases were respectively combined.

Table 2. *Effect Sizes for TWW comparing phases A1 and A2 to B1 and B2*

	PND	PAND	PEM	PET	NAP
Amy	100.00	100.00	100.00	100.00	100.00
Betal	50.00	70.00	100.00	80.00	83.00
Cora	80.00	80.00	90.00	100.00	93.00
Duru	70.00	80.00	100.00	90.00	94.00
Enis	80.00	90.00	100.00	100.00	98.00
Fara	10.00	80.00	100.00	100.00	86.50
Genti	40.00	80.00	90.00	90.00	88.00
Hank	90.00	90.00	100.00	100.00	99.00
Ilja	80.00	90.00	100.00	100.00	95.00
Jan	80.00	90.00	100.00	100.00	98.00
Kent	80.00	90.00	100.00	100.00	98.50

Most of the effect sizes reported in Table 2 suggest that the participants benefitted from the intervention in a significant way. Out of all PAND, PEM, PET, and NAP indices, 79.55% were 90.00 or above, which insinuates that the treatment was very effective. Admittedly, the PND values paint a less favorable picture. Duru's score was 70.00, Betal's was 50.00, Genti's was 40.00, and Fara's was 10.00. Fara's PND was outstandingly low. This was due to the fact that she wrote one extremely long story during A2 that exceeded most of her scores during both B phases. PND is still the most commonly applied overlap method used for quantifying treatment effectiveness in single-case studies (Alresheed, Hott, & Bano, 2013). However, it is also a very conservative technique in comparison to alternative procedures. One single outlier in a baseline phase can lead to relatively distorted results (Jenson, Clark, Kircher, & Kristjansson, 2007), as is not only evident in the case of Fara, but also—to a lesser extent—in the work of Duru, Betal, and Genti.

In a last step, we executed a piecewise regression analysis by first aggregating all eleven cases into one in accordance with a procedure outlined by Wilbert (2018). This approach allowed for a combined evaluation of the ramifications that the intervention had on the whole class. We then analyzed the level and slope effects for each relevant phase comparison. As depicted in Table 3, all but one of the contrasts in question proved to be statistically significant.

Table 3. *Piecewise Regression Model for TWW*

	B	SE	df	t	p
Intercept	39.69	15.01	202	2.64	.01
Trend	4.78	2.46	202	1.94	.05
Level A1 to B1	11.85	10.14	202	1.17	.24
Level B1 to A2	-55.50	10.14	202	-5.47	.00
Level A2 to B2	32.55	10.14	202	3.21	.00
Slope A1 to B1	7.79	3.48	202	2.24	.03
Slope B1 to A2	-12.95	3.48	202	-3.72	.00
Slope A2 to B2	9.86	3.48	202	2.84	.01

Only the level differences between phases A1 and B1 failed to go beyond a p-value of .05. The fact that the piecewise regression analysis revealed a baseline trend does not have to be seen as problematic. As Manolov, Losada, Chacón-Moscoso, and Sanduvete-Chaves (2016) rightly pointed out, "it is possible to assess intervention effectiveness even when the behavior is already improving before the intervention itself" (p. 3).

DISCUSSION

The results of our study indicate that the performance of struggling fourth graders in producing simple narratives can be significantly improved, even by very simple means. All applied procedures to measure the benefits of our multicomponent motivational intervention (visual inspection, effect size calculation, and piecewise regression analysis) suggest that the approach has a tremendous potential to bring even a whole class of very low-achieving elementary school students to eagerly engage in writing. Although some of the PND indices and the level difference between phases A1 and B1 did not add to the accumulation of indications that speak to the potency of our motivational system, there is a broad consensus that all different kinds of data analyses in single-case research should be interpreted jointly (Harrington & Velicer, 2015; Manolov, Losada, Chacón-Moscoso, & Sanduvete-Chaves, 2016). Looking at the results as a whole, our intervention can only be considered as very beneficial.

However, as with every research work, there were a few limitations: We can only make statements about the usefulness of our multicomponent motivational intervention as a whole. There is no way for us to tell if any of the elements would have already been enough to produce effects of a similar magnitude. Besides, we merely focused on quantity (TWW), not on structure, lexical diversity, coherence, and other quality indicators. Considering the fact that

the participants had to turn in their narratives at the end of a 10-minute time slot during both B phases, it must be assumed that some students had to finish their stories rather abruptly. This was probably not conducive to text quality. In addition, our results do not allow for inferences to be made about different populations or different text genres. Our focal point was rather narrow because we limited ourselves to motivating a small class of struggling fourth graders to produce longer stories. The fact that we were not able to provide detailed information about the kind and extent of learning difficulties in our participants makes replications of our study difficult.

Notwithstanding the limited validity and generalizability of our experiment, our findings certainly provide some important research notes on how encouraging it can be for struggling writers to receive support as described above. For students who need some extra help in self-motivating to try hard when tackling a writing assignment, our intervention has proven to be very useful.

It is difficult to underestimate the practical implications of having the option to resort to some effective tools that get struggling learners involved in writing. A great number of teachers feel overwhelmed when teaching composition skills because it seems too demanding. Instead, they limit themselves to other cultural techniques (Grünke & Leonard Zabel, 2015). The ability to read and to engage in life-long learning, competence in using the media, and methodical skills to get involved in research and critically recognize important information are elementary cultural techniques that are urgently required by everyone to be able to cope with school, working life, and the everyday world. However, attending to those skills and competencies must not occur by neglecting writing abilities (Graham, Olinghouse, & Harris, 2010).

Problems in text production are highly prevalent among children and youth, especially among those with learning problems (Graham, Collins, & Rigby-Wills, 2016; Kaldenberg, Ganzeveld, Hosp, & Rodgers, 2016). The ability to compose simple narratives signifies the first milestone on the way to becoming a proficient writer who is competent with producing different genres of text (e.g., informative, argumentative, expository; Grünke & Leonard Zabel, 2015). It is vital to provide academically challenged students with adequate support to enable them to clear this hurdle before they leave elementary school. However, besides focusing on improving content (see e.g., Baker, Gersten, & Graham, 2003), interventions must also address the issue of overcoming motivational barriers to engaging in a writing task (Hidi & Boscolo, 2006).

Students with learning problems are often caught in a downward spiral in which frequent experiences of failure lead to a rising aversion against classroom instruction and a lack of feelings of self-efficacy. Through the performance feedback system described in this article, girls and boys have good prospects of

frequently encountering a sense of achievement. Being able to provide children or youth with "objective proof" of their learning progress by visualizing it subsequent to their effort to try hard will likely lead to more adaptive attributions (Gonzalez, 2015).

As our results have impressively shown, it does not take much to make a difference. Despite little effort, we have succeeded in enormously increasing the length of the stories written by our participants through the motivational intervention. A great advantage of our investigation is that we applied our treatment with a whole class. It was the teacher who provided the support. The research data does not stem from an artificial setting, but has been collected under everyday conditions. Thus, the suitability and the relevance for everyday practice at school are high. Our findings provide teachers with grounds to use our approach with optimism when trying to engage even very unmotivated learners who are struggling with text production.

However, more research is warranted on this topic in order to address the limitations as described above. There is a need to broaden the empirical knowledge base on the benefits of motivational systems with academically challenged students while trying to improve their written composition abilities.

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