Teaching perspective taking and coherence generation to improve cross-genre writing skills in secondary grades: A detailed explanation of an intervention

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Abstract: This paper gives an analytic description of why and how an instructional writing program on the improvement of cross-genre writing skills in German secondary grade level has been designed and implemented. From a diagnostic research phase, and according to theoretical expectations, coherence management and perspective taking proved to be ability components that substantially contribute to text quality across different genres. To train these two abilities in a didactical setting, two 11-unit writing courses were analogously constructed and administered in 5th and 9th grades. There were 12 intervention classes and 12 control classes in each grade, forming 48 classes with 1.145 participants. The decisions that lead to the design of the intervention study and the corresponding didactical settings are explained and justified in detail, and the developed self-learning materials are described in terms of their assumed learning potentials and the underlying didactical principles. Based on the obtained empirical experiences, the intervention is critically evaluated with respect to good intervention research and its proper description.

Keywords: writing competence; perspective taking; coherence; writing intervention; classroom research

journal of WRITING RESEARCH

Grabowski, J., Mathiebe, M., Hachmeister, S., & Becker-Mrotzek, M. (2018). Teaching perspective taking and coherence generation to improve cross-genre writing skills in secondary grades: A detailed explanation of an intervention. Journal of Writing Research, *10(2),* 331-356. doi: 10.17239/jowr-2018.10.01.06

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1. Introduction: Didactical demands during secondary grades

The acquisition of writing skills comprises two quite different developmental aspects: learning to produce *script*, and learning to produce *texts*. The first-mentioned aspect of language acquisition relates mainly to the basic skills of literacy, i.e. reading and orthographical writing (Nunes & Bryant, 2004). It is expected that their mastery will be accomplished, as far as possible, by the end of primary school (cf. Bredel & Reich, 2009). Compared to other school systems (e.g. in The Netherlands; see Rietdijk, Janssen, van Weijen, van den Bergh & Rijlaarsdam, 2017), German primary school ends quite early after year 4, when students are nine or ten years of age. Subsequent writing instruction in secondary grades aims at the composition of more complex linguistic units above sentence level (Graham & Harris, 2000), namely texts. This sequence appears reasonable since basic literacy skills need to become sufficiently proficient in order to allow working memory resources to engage in higher-level processes like planning and organizing (Grabowski, 2010; McCutchen, 2006).

Secondary grade level is considered the time period in which writing development receives its strongest differentiation (Pohl, 2017). In Germany, secondary grades cover school years 5 to 10; students enter this phase at the age of about ten years (being about fifteen at the end of year 10). Depending on the respective school type, students then either graduate and subsequently attend vocational school (at least until the end of compulsory schooling), or they pass through two or three upper school years and take their university-entrance diploma (the German "Abitur").

Around the 1970s, German writing didactics during secondary grades underwent a change from a more rhetorical-oriented approach (with an emphasis on style and formulation) towards a functional perspective: the so-called communicative turn. Since then, the functionality of texts and their quality is appraised, i.e. their comprehensibility for readers and their effects on the intended audience (Ludwig, 2006). However, the production of functionally adequate texts is a challenging and complex task, making high-level demands on writers with respect to the involved language production processes (Grabowski, 1996). The relevant curriculum, or common core standard, specifies the competences that students are expected to have acquired by the end of grades 6, 8, and 10. In the curriculum, writing competences constitute one quarter of the standards for German classes (next to "speaking and listening", "reading (including texts and media)", and "linguistic reasoning"). Given that German is taught four lessons a week, this amounts to one weekly writing lesson on average. (Latterly, subjects other than German also began to systematically contribute to writing education in line with the framework of language-sensitive teaching.)

However, the nationwide educational standards ("Bildungsstandards") formulate mandatory competence goals without explaining the didactical methods and approaches by which they could be achieved. In didactical practice, writing tasks most often aim at students' generating a complete text on a given topic. Here, the traditional

school genres predominate: narration, description, report, instruction, and argumentation. Even when process-oriented approaches are taken, where the writing process is dissected such that implicit hints or explicit assignments direct the writers' activities, e.g., to planning, formulation, or revision phases (in the tradition of Hayes & Flower, 1980), the overall assignments most often remain bound to a complete final text. For instance, during planning students are expected to "decide on an appropriate text type, and draft texts with respect to goals, audience, and situation" (Standing Conference of the Ministers of Education and Cultural Affairs; henceforth: KMK, 2004, p. 12). This practice may originate in the didactically well-founded preference for integrated classroom instruction.

The fact that standards are provided without a notion of appropriate didactical means to achieve them appears particularly problematic because students' actual writing achievements are not considered satisfactory. Recent survey data on a psychometrically developed model of writing competence levels (KMK, 2014) showed that about one third of the students that intend to graduate after year 10 wrote texts in year 9 that were rated below the expected regular standard. For example, 32.2% of informational texts and 37.1% of narrative texts were rated at competence levels I (below minimum standard) or II (minimum standard). Only for argumentative texts, this proportion was slightly lower (26.5%). Thus, there is obvious need to find measures that improve students' writing abilities in all relevant genres.

In the past two decades many writing intervention studies successfully focused on general meta-cognitive abilities like strategies or self-regulation (cf. Graham, 2008; Graham & Harris, 2018; Graham, Harris & Santangelo, 2015; Miller, Scott & McTigue, 2018; see Rietdijk et al., 2017, for a genre-specific strategy training). In contrast, we were interested in the didactical gaps between basic literacy proficiency (acquired during primary school) and the ability to produce complete texts. Which immediate cognitive and linguistic abilities (rather than meta-cognitive abilities) can serve as intermediate steps to a writing competence that can be systematically taught and will improve the resulting text quality across genres? Therefore, we theoretically and empirically derive and explain the two most relevant ability candidates in the next section. After that, section 3 will provide detailed descriptions and explanations of the decisions we took with respect to the intervention design, the instructional procedures, and the intended learning activities, followed by a concluding discussion on what we learned from the study as well as from its proper analytic description (section 4).

2. Theoretical background: Perspective taking and coherence management as subcomponents of writing competence

As explained in the introductory section, we were striving to identify overarching subcomponents of writing competence that can become operative across different text types and typical composition tasks. To that end, we assumed three criteria to identify relevant ability components of writing competence; these components will

subsequently be didactically treated in the form of instructional support in classrooms (cf. Grabowski, Becker-Mrotzek, Knopp, Jost & Weinzierl, 2014):

- *Theoretical criterion*: Potential ability components that contribute to writing competence must be derivable from existing psychological or linguistic models, or at least in accordance with existing findings. They should be sufficiently specific for writing skills (i.e., going beyond general intellectual and linguistic capacities that predict many educational achievements to certain degrees).
- *Empirical criterion*: The considered ability aspects must prove to be empirically relevant. This can be estimated from their prediction of the resulting quality of produced texts, which is the most typical indication of writing competence (cf. Van Steendam, Tillema, Rijlaarsdam & van den Bergh, 2012). Moreover, the correlation with indications of writing competence should be direct and stable, excluding characteristics that may change from situation to situation or considerably vary within an individual, like motivational or affective factors.
- *Practical criterion*: If the contribution of an ability facet to writing competence has been empirically confirmed, it must also be appropriate for its instructional support through intended didactical measures. This implies that relevant abilities can be influenced or modified through learning processes.

From the above-mentioned considerations, two didactically relevant components of writing competence emerged that might transfer across genres: the ability of perspective taking (as a prerequisite of texts being tailored to their addressees), and the ability to recognize and to produce well-structured interrelations (coherence). We will combine the comprehension and production facets of coherence in the term *coherence management*. Note that both ability components comprise not only linguistic, but also – if not mainly – cognitive aspects. It is particularly important that the cognitive operations and the mastery of the target language in which texts will be written can (to a certain degree) develop independently. Given the magnitude of about 40 percent of students in German cities growing up in families in which languages other than German are spoken, it is important to provide instructional writing support that can be potentially successful even for students with limited or delayed command of the German language.

Next, we will briefly explain the two ability constructs, and refer to the results of a diagnostic study which provided evidence for their connection with text quality according to the above-mentioned empirical criterion.

2.1 Perspective taking

In order to be functionally successful, all kinds of texts must consider the intended readers. The proper orientation towards the addressee(s) requires the ability to take a potential reader's perspective, including his or her prior knowledge, needs, and requirements. For example, general conversational maxims (Grice, 1975) would

indicate conveying something thematically significant (maxim of relevance), and to include not more, but also not less than the necessary information for understanding (maxim of quantity).

Developmental psychologists often consider perspective taking in the form of *theory-of-mind* concepts. Typical operationalizations aim at the cognitively adequate representation of a situation-specific knowledge-related advantage over one or more other persons ("false belief tasks": e.g., Wimmer & Perner, 1983; for an overview see Wellmann, Cross & Watson, 2001). For age groups older than pre-school children, Steins and Wicklund (1993) differentiate between three facets of perspective taking. In addition to the conceptual facet (to imagine what the other person knows), they assume a visuo-spatial (to imagine what the other person sees) and an affective-emotional facet (to imagine what the other person feels). Note that affective-emotional perspective taking is different from empathy (Davis, 1983). Schmitt (2011) has shown a positive correlation between the ability to imagine (and subsequently consider) what the partner feels, and text quality, but a negative correlation for empathy (sharing the partner's feelings) and text quality for a sample of university students. There is empirical evidence that the very cognitive ability of perspective taking is relevant for the audience design of texts (e.g., Holliway & McCutchen, 2004).

Because it seems that from a certain age perspective-taking tasks of all facets become rather easy to solve and, thus, do not show much variance between adolescent or adult students, Schmitt (2011) developed simple computer-based decision tasks. While the percentage of correct reactions remained constantly high, the reaction times on the items produced remarkable differences. Higher perspective-taking abilities became visible in faster decisions on critical items.

2.2 Coherence management

If written utterances are to be understood as a text, the sequence of sentences must have coherence. An important contribution to coherence comes from connecting linguistic means like conjunctions, anaphora, or tense (co-called *cohesion devices*; cf. Witte & Faigley, 1981). Moreover, means that affect the global text level help to establish coherence, e.g. structuring elements like "first", "second", meta-communicative phrases like "subsequently, we will show ...", or semantic content that points beyond the text itself in order to support the readers' construction of a mental model (Schnotz, 1994).

The coherence construct relates to two aspects: mental construction and achievement, and properties of linguistic surfaces. Both aspects have been studied intensively for reading and understanding (e.g., McNamara & Kintsch, 1996; Crossley, Kyle & McNamara, 2016). Successful reading of a text allows for the construction of a connected mental model (Kintsch, 1998). From a writer's production perspective, coherence can also be considered as a mental phenomenon. The writer has a coherent mental model of the issue to be conveyed, which is then transferred into written language. In the given context, coherence management comprises the abilities to

mentally construct a connected model, and to establish linguistic means in a text that allow a reader to (re-)build an adequate model as well (cf. Weinzierl & Grabowski, 2016).

2.3 Perspective taking, coherence management, and text quality: A diagnostic study

In a diagnostic study preceding the intervention study reported below, students of 5th and 9th grades (5th grade: *n* = 146, mean age= 11;1 years; 9th grade: *n* = 131, mean age = 15;8 years) performed three writing tasks, namely an instructional, a reporting, and an argumentative text (cf. Becker-Mrotzek, Grabowski, Jost, Knopp & Linnemann, 2014; Knopp, Becker-Mrotzek & Grabowski, 2013). The writing tasks were, as far as possible, instructed via pictorial stimuli in order to keep potential influences of reading comprehension small. E.g., a sequence of six pictures was used to stimulate a recipe (= instructional text) of how to cook pasta. Text quality was assessed with four different approaches (for details, see Grabowski et al., 2014), namely text length, NAEP competence levels (Duncan, Betka & Kerachsky, 2009), global functional ratings, and analytical linguistic ratings. The results of the approaches were strongly intercorrelated and were therefore aggregated into an overall score providing an exceptionally robust indication of text quality. Moreover, participants took tests on general cognitive and linguistic abilities (working memory spans; reading fluency; vocabulary; motor writing fluency after Berninger et al., 1992), and performed tasks that assessed their perspective taking and coherence management abilities as described above. Altogether, data collection took the time of four teaching units (each 45 minutes) per participant and was conducted in the respective schools under highly controlled conditions in two single and two group sessions. Since 9th graders performed significantly better than 5th graders on most tasks, regression analyses on the three text quality measures were computed separately for the two grades. It turned out that all variables together (general cognitive and linguistic abilities, perspective taking and coherence management) predicted the quality of each of the three texts to substantial degrees; explained variance varied between 39 percent (instructional text in 5th grade) and 57 percent (instructional text in 9th grade). Only for the argumentative text in the 5th grade, the prediction variables explained no more than 22 percent of variance, probably because the argumentative genre had not yet been instructed in 5th grade.

Since general cognitive and linguistic abilities correlate with both perspective taking and coherence-related abilities, the most interesting result is the incremental prediction of text quality by perspective taking and coherence management abilities, compared to the extent of prediction by general cognitive and linguistic abilities alone. Here, the two assumed subcomponents of writing competence add more than 10 percent of unique predictability of text quality that were not captured by the general cognitive and linguistic prerequisites, with one exception (instructional text in grade 5: 4 percent increment). These additional amounts of prediction appear quite relevant, given the fact

that the general abilities (i.e. those not specific for writing) already explain up to around 40 percent of the text quality variance. Moreover, if the common relationship with general cognitive and linguistic abilities is partialed out, perspective taking and coherence management are no longer significantly intercorrelated (5^{th} grade: $r = .08$; 9^{th} grade: $r = .06$), indicating that the two abilities provide mutually independent contributions to writing competence.

Thus, from the pattern of results of the diagnostic study, it appears justifiable to develop and provide didactical support of perspective taking and coherence-related abilities in order to improve text quality across different text types. It is particularly important, from a didactical perspective, that both abilities include cognitive aspects that are not necessarily bound to a sufficiently good command of the target language. Ability aspects of both perspective taking (as a part of social cognition) and coherence management (as a part of logical thinking) can be assessed with task formats that do not exclusively depend on linguistic proficiency. Corresponding instructional methods (that are not entirely built on linguistic skills) can be particularly advantageous for students with weak linguistic and writing skills, if they offer learning tasks and exercises that do not directly aim at the composition of full texts. This may also (partially) compensate for the lower writing motivation reported for weaker writers (e.g., National Center for Education, 2012). In the next section, we will describe how we transferred these findings and insights into an intervention program.

3. An intervention program on perspective taking and coherence generation

Based on the aforementioned considerations, we developed an intervention program (and conducted a related intervention study) to improve writing competence across genres by instructional support of perspective taking and coherence management abilities. Rather than reporting the empirical research study, the focus of the present paper is to describe how the intervention has been planned and developed, and which underlying didactical principles have been operationalized in that process. To that end, we will first explain some general decisions and design principles that guided the preparation and conduction of the intervention (section 3.1), before we concentrate on the didactical structure of the instructional materials and the assumed learning activities (section 3.2). After that, we will present a brief summary of the empirical study and its results (section 3.3). Finally, some implications on how to describe and how to design intervention studies will be critically discussed (section 4).

3.1 General underlying decisions

In order to connect the intervention program to the groundwork of the diagnostic study described above, and in accordance with the requirements of the approved grant proposal, we maintained the focus on age groups at the beginning and at the end of secondary grades, i.e. on classes 5 and 9. In addition, the intervention was expected to be ecologically valid, which means that it needs to prove sufficient compatibility with

regular classroom instruction. At the same time, the requirement of ecological validity needs to be balanced with an appropriate level of internal validity which ensures that the results of the concomitant research study can be clearly interpreted as a function of the didactical measures and the related learning activities (cf. Shadish, Cook & Campbell, 2002). On these preconditions, we took some general decisions regarding the planning, composition, and implementation of the intervention.

In order to fit the organizational teaching routines at school, the intervention should be neither an extra-curricular training nor a supportive measure additional to the regular German lessons. This had consequences for the possible length of the intervention (cf. the information on the curriculum in section 1). It therefore appeared reasonable and feasible to plan for about ten lessons, taught once a week, to be spent on writing-related instruction.

Essentially, intervention participants were to receive didactical support to improve their abilities of perspective taking and coherence management, and to use these abilities for the composition of functionally successful texts. If such arrangements are suitable for regular classroom education, the regular German teachers of the respective classes must apply them. This again contributes to the ecological validity of the study, particularly if a successful writing intervention is subsequently to be considered for transfer into classroom practice, but it may threaten a high degree of standardization across classrooms (as a condition of internal validity). Otherwise, if the researchers themselves would apply the program in the best standardized way, this would resemble a special training situation rather than regular tuition, restricting the results' transferability to typical classroom education.

Given that teachers make a difference (Hattie, 2008), however, the intervention program should not allow too many individual differences between the participating teachers, but make sure that they comparably apply it conform to the concept. Likewise, the different teachers involved in the intervention (which was simultaneously applied in 24 classes) would probably show quite different degrees of commitment and enthusiasm during their lessons. Moreover, the concept of perspective taking in particular does not belong to the linguistic experiences that German teachers have acquired during their professional studies. (At least, it is not included in the educational standards; cf. KMK, 2004.) On the other hand, teachers – even if they agreed to convey the program in their classes – do seldom have the time to participate in an additional preparatory training on the central (though novel and unusual) domains of the intervention.

Therefore, we decided to prepare teaching materials that the students could work on independently and autonomously, mostly in form of individual work, sporadically also in form of collaborative work in pairs. Given this focus on self-learning materials, the intervention was content-based rather than strategy-based. We designed eleven learning units that were prepared for one lesson each. The lessons were operated once a week. The teachers' function was to assure the necessary frame conditions in the classroom: distributing the materials, illustrating their use to the students, monitoring

the progress of work, answering comprehension questions, and maintaining the required acoustic and behavioral discipline so that all students could work through the respective learning unit until its end. Because students work at different speeds, so that classroom didactics require means of differentiation, there was always a facultative writing task at the end of each unit (see section 3.2 below). The participating teachers received an instructional booklet together with the intervention materials in which we explained the use of the materials and the process of the intervention and provided answers to expected questions (FAQ). Additionally, the members of the research team gave an individual briefing. Since the learning units were available to the teachers in advance, they were able to familiarize themselves with the tasks of the respective next unit. It was beyond our control, however, whether they actually did so. Moreover, the teachers documented the attendance of the students, the queries they received, and any problems or peculiarities that arose within the respective units. Members of the research team observed two or three lessons per class, not only to see how the teacher implemented the intervention, but also to see how the learning units worked in terms of understanding and timing.

3.2 *Scriptoria*: Teaching materials, didactical principles, and assumed learning activities

Recently, Rijlaarsdam et al. (2018) proposed a scheme of how to report the underlying principles of writing interventions. In addition to design principles and teaching activities, this proposal emphasizes the importance of the assumed learning activities as a basic unit of description (p. 285). Therefore, we will subsequently illustrate the didactical motivation and structure of our self-learning materials, and link the individual steps to the involved learning activities.

Cover story and topical framing

We have already explained that the intervention was material-based, mainly composed of two 11-unit self-learning courses for 5th and 9th grade students. We held the concept of the two courses parallel as far as possible, with respect to topic treatment, the used types of tasks and the intended learning activities. However, the contexts, as well as the graphical design, varied according to the age groups: In grade 5, students went on a journey through a land named *Scriptoria*, the inhabitants of which almost manically love to write, and prepared themselves for a writing contest. In grade 9, students were completing an internship in an advertising agency named *Scriptoria*, ascending through the levels of the building, where they received language-related tasks when participating in the operational routines of the respective departments. We chose the framings of the courses to motivate the students and to provide a connected context for the learning tasks and exercises. Particularly for grade 9, this is in line with Merrill's (2002) principles "problem centered" and "activation", as students engage in real-world problems and situations and are asked for the recall of knowledge from relevant (past)

experience (see also Rijlaarsdam et al., 2018). Figure 1 shows the covers of the weekly supplemented materials.

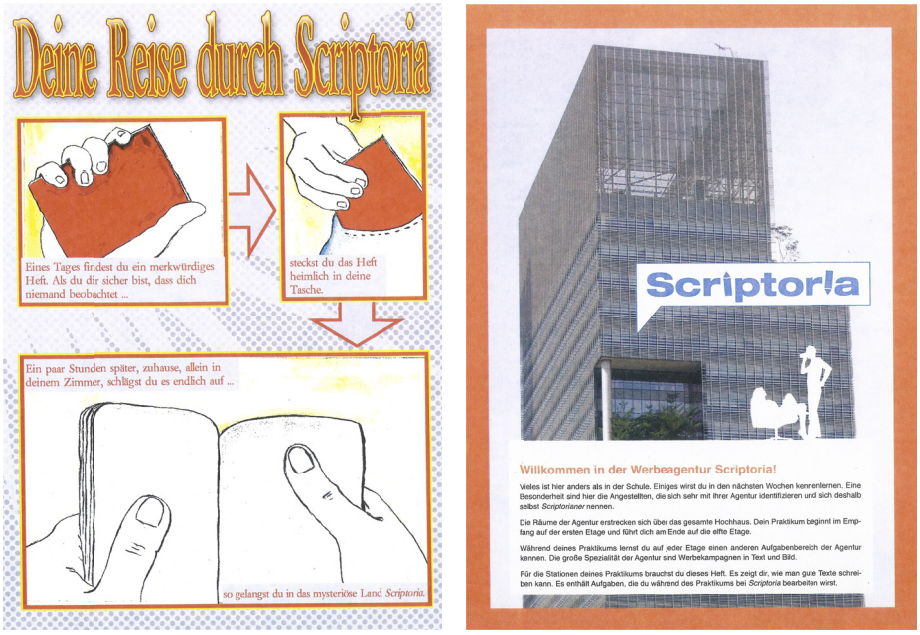


Figure 1: Design examples (cover page) for 5th (left: "Your journey through Scriptoria") and 9th (right: "Welcome to the advertising agency Scriptoria!") grades.

Table 1 gives an overview of the topical attribution of the units, the associated focus on competence components, and the assumed learning activities within the respective sessions to improve the students' skills on the didactically introduced ability components. As the main goal of the intervention was to fill the didactical gap between basic literacy competences and the production of complete functional texts, many of the learning activities mentioned in Table 1 do not serve to write full texts at the end. They rather aim at the understanding of perspective taking and coherence management as important components of successful writing; therefore, we could also introduce the corresponding skills non-verbally. Note that Rijlaarsdam et al. (2018) illustrate their proposed framework with writing interventions that mainly involve writing strategies; basically, however, it does also work for interventions aimed at basic prerequisites and components of writing competence.

While the front sides of the folders are shown in Figure 1, their backs contained a survey of the units, similar to the lists in Table 1. To facilitate the handling of the materials especially for poor readers, we used pictographic symbols of the different

Table 1. Scriptoria: Topical framing, assignment of competence components, and main learning activities (CM = coherence management, PT = perspective taking).

	Topical framing			
unit/ week	grade 5 (travelling stages)	grade 9 (levels of business building)	competence component	intended learning activities according to Rijlaarsdam et al. (2018)
1	Arrival in Scriptoria	Kick-off in the advertising agency	CM: introduction of thread and knots	analysing/synthesizing; practising/applying
2	The inhabitants of Scriptoria	The team of the agency	CM: temporal & causal conjunctions	analysing; practising/applying
3	Living in Scriptoria	The agency's furniture	CM: final & concessive conjunctions	generative/divergent thinking; practising/applying
4	Nutrition in Scriptoria	The campaign "veggie day"	CM: references & synonyms	generative thinking; practising/applying
5	Festivities in Scriptoria	A company party in the agency	CM: beginning, ending, connecting passages	practising/applying
6	Locomotion in Scriptoria	Leisure and off time in the agency	PT: visuo-spatial	observing/noticing; analysing; practising
7	The treasures of Scriptoria	The company outing	PT: visuo-spatial	observing/noticing; analysing; practising/transfer
8	News in Scriptoria	Communication in the agency	PT: affective-emotional & conceptual	noticing; explorative thinking; structuring; practicing
9	The final days before the contest	Your own publicity campaign	PT: conceptual	noticing; analysing; evaluate thinking; practising
10	The great writing contest	Your leaving certificate	PT: all three facets	analysing; applying/ automation/transfer
11	Returning from Scriptoria	The internship report	CM: repetition	applying/automation/ transfer

Note. British spelling of learning activities is maintained from the original.

learning activities and the requested kinds of task processing on the margins of the materials. We explained these symbols on the inner side of the folder, along with instructions on how to go through the units. Furthermore, during the first lesson, students received a durable *memo card*, on which we recapped the most important aids regarding how to consider coherence management and perspective taking during text production. Didactically, on the memo cards and in the units, linguistic elements that interconnect the text (coherence) were illustrated by *knots* of different colors. The facets of perspective taking (space, feelings, and knowledge) were illustrated by *glasses* that help the writer to assume the readers' view. Students were instructed to use the memo card whenever they write a text (see Figure 2), which should support the automation and transfer of the newly learned contents (learning activities: automation/transfer).

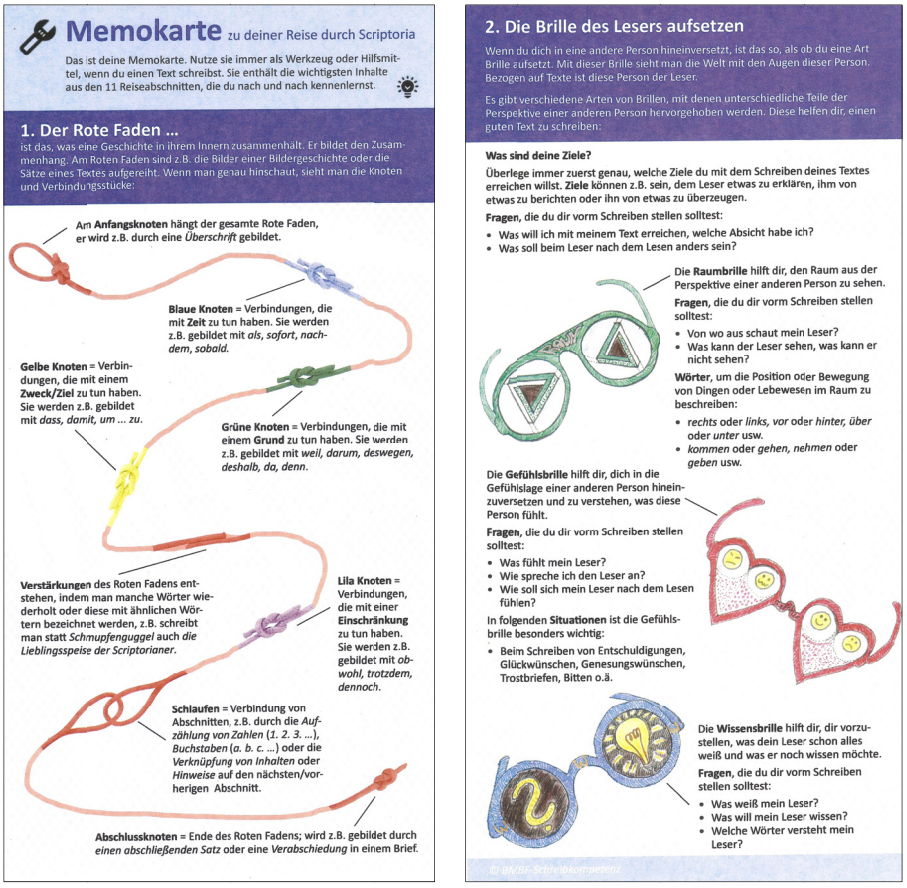


Figure 2: Front (left) and back (right) of the memo card for 5th-graders.

Structure and elements of each unit

To enable all students to benefit from our program, especially those with weaker language proficiency, we constructed each learning unit according to four didactical principles:

- from simple to complex;
- from pictorial over minimal linguistic contexts to text;
- from closed to half-open to open task formats;
- from language reception to language production.

The first principle is very basic for didactical introduction in many domains (e.g., Terhart, 2009; see already Bloom, 1976). Next, pictorial information is, in many cases, more directly and, thus, easier to process than linguistic information, particularly for students with weaker linguistic proficiency in the target language. Closed task formats offer alternatives from which the correct or appropriate solution only needs to be selected and inserted; therefore, attempts at solving a problem can at least be made, while students may fail even to work on an open-format task if they did not yet understand the required concept(s). And finally, language comprehension is, in many cases, a prerequisite of language production (Grabowski, 1996); so-called passive (or receptive) language proficiency is generally more extensive than active (or productive) language proficiency, particularly regarding vocabulary (Mathiebe, 2018). Insofar, all above-named principles are specifications of the first one – from simple to complex – for different instructional aspects.

The first tasks of each unit use pictures to demonstrate where the connection between the given facts or circumstances exists, or how a situation can be perceived from different perspectives. In doing so, verbal instructions remain minimal in order to avoid linguistic barriers, and students get the chance to focus attention on the new content (learning activity: noticing). Only in the second step, the implicit understanding is made explicit through verbalization; e.g., a picture story is renarrated. Then, attention is directed to the linguistic means used to establish coherence, or to address the reader (learning activities: analyzing, structuring, evaluate thinking). Further steps provide production tasks, in which the students themselves produce – to increasing extents – coherence, or audience orientation (learning activity: practicing/applying).

When new content is introduced, the units provide examples and simple exercises, which are subsequently deepened. Thematic sections end with a highlighted summary of the key contents. For each unit, the teacher provides solution sheets which the students glue into their folders in order to independently control, or revise, their individual solutions (learning activity: evaluate thinking).

Each unit has an optional open writing task at the end, which takes up the newly-introduced elements and offers opportunities for exercise and transfer (learning activity: practicing/applying/automatization). It also serves as a time buffer, because the students' individual processing speed considerably differs. Besides providing didactical

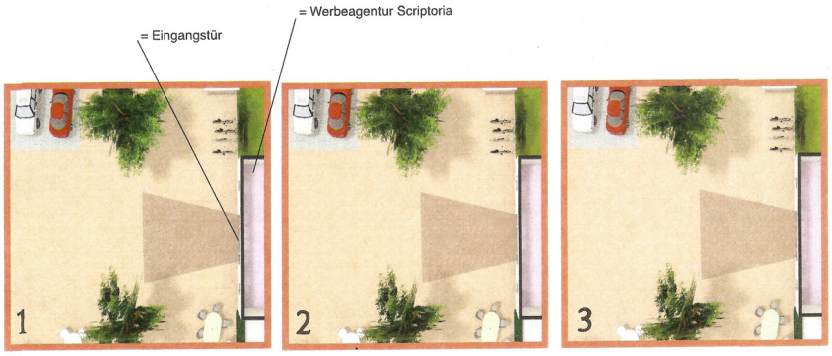
motivation, these concluding tasks are also conducive to the structural organization of a teaching lesson. We will return to this aspect in the general discussion.

Example of a learning unit

In the following, we will illustrate the structure of the learning units using the example of the second unit from the 9th grade course (*the team of the agency*; see Table 1). Thematically, the unit is about establishing coherence using conjunctions, starting with temporal and causal relations. The common image of a *continuous thread*, which the students may already know from previous German lessons, symbolizes the linguistic constructs of coherence, and cohesion, respectively. However, the thread as such does not specify how to build the connections within a text. Additional information about the linguistic means that produce the cohesion of a text is needed. Therefore, we supplemented the thread image with *knots* that tie the sentences of a text, or the imaginary sections of the thread, together. If the thread is put under the microscope, knots of different colors become visible, which connect parts of the text in different ways. Mainly, this is a visualization of different conjunctions like temporal, causal, final and concessive ones, complemented by clues on how to start and terminate a coherent text. Thus, the thread with its different types of knots is the central didactical strategy for the acquisition of coherence-related abilities. By means of the different knots, students gradually learn to connect the propositions of a text such that their logical interrelations become linguistically expressed.

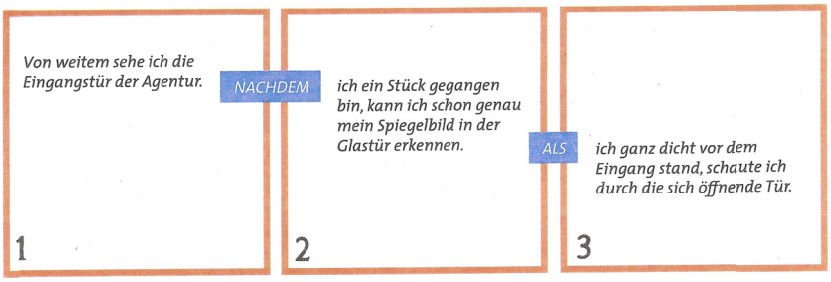
Accordingly, the second unit starts with a *drawing task*. The students should chart the successive positions of a person who is approaching the entrance of the agency's office building in a sequence of three pictures (see Figure 3). Subsequently, the students read a simple text with a description of what the person sees while approaching the door. The positional statements are connected with temporal conjunctions: "*After* I moved some steps forward, I can already see my mirror image in the glass door." Next, the temporal knots are visualized through a magnifier in order to generate knowledge about the connecting function of the conjunctions (see Figure 4; learning activity: noticing). Cognitive support is provided insofar as the thematical connection between the sentences is already known from the picture sequence (according to Merrill's principle of activation); attention can be solely devoted to the coherence-creating function of the conjunction.

Aufgabe 1: Zeichne in die drei Bilder unten ein, wie man dich von oben aus der Vogelperspektive sieht, während du dich der Eingangstür der Agentur näherst. Markiere deine Position in jedem Bild mit einem Kreuz. Zeichne deinen zurückgelegten Weg mit gestrichelten Linien ein.



Tipp: Stell dir vor, dass du in Bild 1 noch weit von der Eingangstür entfernt bist. In Bild 3 stehst du dann ganz nah vor der Eingangstür. Am Ende sieht das Ganze so ähnlich aus wie ein Weg, der in eine Karte eingetragen wird.

Als Text würden die Bilder aus Aufgabe 1 zum Beispiel so aussehen:



Das Wort *NACHDEM* verbindet den ersten mit dem zweiten Satz. Genauso verbindet das Wort *ALS* den zweiten und den dritten Satz. Sie bilden den Roten Faden, den du ja schon kennst.

Wenn du wie mit einer Lupe genau hinschaust, kannst du solche Verbindungen zwischen Sätzen in einem Text erkennen. Diese Verbindungen heißen Konjunktionen und sind wie Knoten. Zuerst schauen wir nur blaue Knoten an – die haben etwas mit Zeit zu tun und werden **temporale Konjunktionen** genannt:

Figure 3: Task 1 from unit 2 in the 9th grade course.

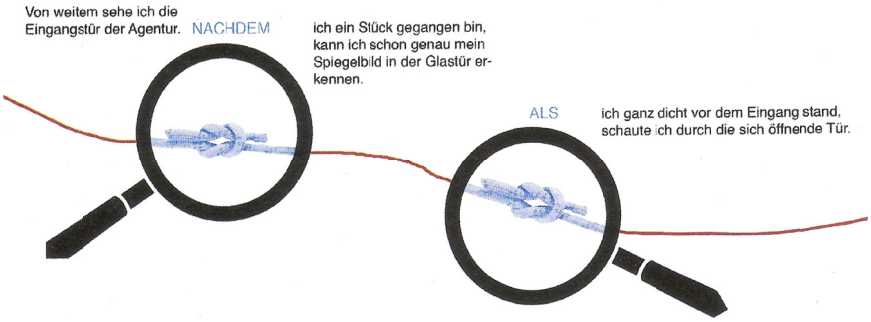


Figure 4: Visualization of the conjunctions as knots (NACHDEM = "after"; "ALS" = "when").

In the *second task*, the students inspect a picture story, which is subsequently renarrated in a cloze text, where the appropriate temporal conjunctions need to be inserted (learning activity: analyzing/synthesizing). The *third task* similarly starts with a picture story; afterwards, the students mark the temporal conjunctions – in the form of knots in the thread – in the written story (learning activity: analyzing). And finally, in the *fourth task*, causal connections are introduced, and the learners meaningfully complement sentences that either already contain a conjunction ("*Since* the staff strongly identifies with the agency, ...") or that must be completed after a conjunction ("The agency tries to employ two trainees per year. *Therefore*, ...") (learning activity: practicing/applying).

Task difficulty increases with more production-related parts of the tasks within the learning units for coherence management. Students decide on cohesive means that fit best, they independently draw the thread with all its knots, they find headlines or connecting passages for given texts, or they revise and rewrite deficient texts. The learning units for perspective taking were analogously structured.

3.3 Did the intervention work? A summary of the empirical intervention study

The focus of this paper is on the proper description of the intervention and its instructional features, not on the empirical study conducted to evaluate the effects of the intervention. Therefore, we will only briefly outline the design (section 3.3.1) and the participants (section 3.3.2) of the study, and give a condensed overview of the results (section 3.3.3).

Design and measures

We conducted a quasi-experimental study with three independent factors:

- *Grade*: In order to maintain the research focus on secondary grades (see section 3.1 above), we applied the intervention to grades 5 and 9.
- *School type*: Instructional measures that are supposed to work for different individual capabilities are obliged to consider school types of different academic levels. Therefore, classes came from German "Gymnasium" (which is a kind of grammar school, attended by some 40 per cent of an age cohort), and from comprehensive schools.
- *Condition*: We matched each intervention class with a control class with respect to grade and school type in order to control for the internal validity of the results, which ensures causal interpretations of possible intervention effects (Shadish, Cook & Campbell, 2002). Control group participants received regular German lessons. The main difference between intervention and control classes was the provision of tasks – and the corresponding learning opportunities – regarding perspective taking and coherence management.

Moreover, we intended that students with weaker language and writing abilities would profit from the instructional intervention as well. This is particularly important for students with linguistic migration backgrounds (i.e., living in families in which languages different from German are spoken). These students are most frequently represented in urban schools of bigger cities. Therefore, the study was implemented in schools of two German cities with more than 500.000 (Hanover) and more than a million (Cologne) inhabitants, providing a broader spectrum of cultural and linguistic diversity and social stratification among the participants than rural environments.

Besides the instructional procedures of the intervention, we tested all students for relevant cognitive and linguistic abilities, including working memory spans, tests on reading fluency (SLS 5–8; Auer, Gruber, Mayringer & Wimmer, 2011), writing fluency (*alphabet task*; Berninger et al., 1992), and vocabulary (WS scale from CFT 20-R; Weiß, 2006). Furthermore, self-developed tests on perspective taking (conceptual, spatial, and affective facets; see Schmitt, 2011) and coherence management (e.g., picture story serialization and evaluation, understanding of referential expressions and conjunctions) were administered. Finally, participants performed writing tasks of two different text types (report and argumentation) on three occasions: before the intervention (= MT1), after the intervention (= MT2), and approximately six months (but within the same school year) after the intervention (= MT3). Thus, the intervention study has the overall structure of a quasi-experimental pre-post-follow-up design. Full instructions of the writing assignments are provided at our research database on learners' texts (FD-LEX, (2018); the methods we applied to assess the quality of the obtained reporting and argumentative texts (statistical measures, functional ratings, and analytical ratings) are explained in Grabowski et al. (2014).

Participants

After exclusion of 25 students who missed three or more intervention lessons, the final sample comprised data from 1.145 students from 48 classes (six classes per grade, school type, and condition). 5th grade students (n = 589; 284 male, 305 female) were 10;9 years old on average, the mean age of 9th grade students (n = 556; 265 male, 291 female) was 14;10 years. There were 501 participants from comprehensive schools and 644 from grammar school. Forty-four percent of the students lived in families in which a language different from German is spoken; this percentage was significantly higher in comprehensive schools (54 percent) than in grammar schools (35 percent; $\chi^2_{df=1} = 39.65$, $p < .001$). There were over 30 different non-German family languages, most frequently Turkish (6 percent) and Russian (2.5 percent).

Results

Data analysis is not yet fully completed, and results of the intervention study have not been published elsewhere. Consequently, we will only briefly present some general results, along with their preliminary discussion.

The expectable effects of the factors "grade" and "school type" occurred, without exception, for all achievement variables at MT1: 9th graders performed significantly better than 5th graders, and grammar school students performed better than comprehensive school students.

In 5th grade, students with a linguistic migration background had worse results on all measures, including text quality, except for visuo-spatial memory span and basic reaction time. In 9th grade, differences between students with different language biographies were no longer present for all memory span measures, for the alphabet task, and for the conceptual facet of perspective taking. Predominantly these variables relate to cognitive, but not to linguistic abilities. However, even towards the end of their secondary grades, students speaking non-German languages at home still have significant disadvantages on the language-related measures.

When all variables at MT1 were entered in regression analyses, text quality of the reports was predicted with multiple R = .47, text quality of the argumentative texts was predicted with multiple R = .44. Thus, we may assume that, similar to the preceding diagnostic study (see section 2.3 above), the considered variables are relevant prerequisites, or components, of writing competence.

If the intervention were to prove successful in the intended way, we would expect a significant interaction between the condition factor (intervention vs. control group) and the repeated measurement factor across the three measurement times, such that students who received the intervention would show a stronger improvement of text quality than the control group students would. In contrast, the results yielded no general patterns in favor of an intervention effect on text quality:

- In 5th graders' reports, the intervention group already showed better text quality at MT1; control group students caught up to an equal level of text quality for both

groups at MT2, and the intervention group students, but not control group students, further improved their text quality at MT3.

- Text quality of 9th graders' reports, however, varied rather unsystematically across the three measurement times, except for the fact that control group students, on each of the three occasions, wrote better texts than intervention group students.
- The argumentative texts of 5th graders showed almost identical quality levels for intervention and control group students, which both significantly improved across the three measurement times.
- Grade 9 students also wrote argumentative texts of comparable quality in both conditions, but the quality dropped at MT2 and rose again at MT3.

Overall, the obtained results appear to reflect relevant plausibility of the data. However, the expected advantage of the intervention on text quality did not systematically occur. Particularly, the writing tasks at MT2 might have had different affordances for grade 5 and grade 9 students. If only text quality at MT1 and MT3 (pre-test and follow-up test) is compared, it turned out that all students significantly improved for both text types, and that the differences between 5th and 9th grades decreased from MT1 to MT3 (indicated by significant condition × grade interaction effects for both text types). So at least the intervention was not detrimental for intervention group participants compared to the participants of regular German lessons. We will critically discuss some interpretations of the (preliminary) results in the concluding section.

4. General discussion

Rijlaarsdam et al. (2018) are certainly right when they claim that the peculiarities of the independent variables of an intervention study often lack proper description in research papers. In this particular aspect, their proposal goes further than Graham and Harris (2014) who recommend to "provide a clear, cogent, and full description" (p. 112) of intervention studies as part of their research quality. Whether or not the respective interventions were empirically successful, their careful description can help the research community to make use of operational experiences beyond the mere acknowledgement of result patterns (often subsequently combined in meta-analyses). In the context of this awareness, we made an effort to explain in detail the theoretical and empirical motivation to train the two ability domains of perspective taking and coherence management in order to improve writing competence across genres in German second grade students. Here, "theoretical" and "empirical" refer to the likewise important distinction between the intervention construct and its operationalization (Rijlaarsdam et al., 2018, p. 281). We discussed the involved didactical and methodological principles in the previous section. Subsequently, we will critically refer to central aspects that we learned from the study itself, but also from the requirement to describe systematically the underlying principles.

4.1 Lessons learned: How to describe intervention studies

A strong motivation for the detailed description of intervention studies relates to the premise that such studies were empirically successful and should therefore be made available for potential educational practitioners. However, our intervention program has not led to the intended effects. Students who received the intervention showed no stronger improvement of text quality than those who participated in the control group. Nevertheless, a detailed description of the intervention can still be beneficial to share our experiences not only with educational practitioners, but also with other researchers in the field. Moreover, a careful analytical reflection may also help authors themselves to detect possible weaknesses or shortcomings better, leading to improved next steps in the respective research program.

At the same time, our experiences may also expand the framework proposed in the reference model of Rijlaarsdam et al. (2018). The fact that we followed a concept of improving writing competence different from the typical strategy-based writing trainings, which most frequently aimed at the production of complete texts, challenged the application of the framework. Thus, assigning learning activities to the didactical steps of the self-learning units (see Table 1) was not always easy, or unambiguous, because the given illustrations mostly refer to strategy-based writing interventions. At the same time, on the other hand, our concept of self-learning materials prevented much differentiation of teaching activities. Although we acknowledge that a first proposal of how to describe intervention studies properly must concentrate on a restricted domain of typical studies, it appears worth to discuss whether the model is already suited to fit any kind of writing intervention, or whether additional patterns need to be developed.

The need for detailed descriptions of intervention studies does not start with the operationalization of the relevant didactical constructs and their subsequent implementation, but much earlier in a research stage where the theoretical background is chosen and scrutinized with respect to its usefulness in relation to practice. This is why we first conducted a diagnostic study to prove the relevance of our target constructs (perspective taking and coherence management) for a subsequent instructional implementation. We would therefore recommend including all the involved stages of the entire research program in the detailed analytical description according to Rijlaarsdam et al.'s (2018) proposal.

Although this Special Issue and the corresponding volume of the Studies in Writing Series (Fidalgo, Harris & Braaksma, 2018) pave the way for more detailed descriptions of intervention studies, it remains questionable whether non-electronic journal publications can accommodate the number of pages that are needed beyond the typical APA structure of empirical papers. Probably, an adapted notion of what is relevant and in which detail will be needed, when it comes to the publication of empirical intervention studies.

4.2 Lessons learned: How to design intervention studies

Although the empirical results of the reported intervention study were not in the focus of the present paper, we must admit that the intervention effects did not occur as expected. Nonetheless, data quality can be considered to be high (because the expectable design effects of age and school type occurred), and there were no counter-intuitive result patterns. Apparently, the instructional procedures taken in the intervention were not strong enough, or not sufficiently adequate, to produce observable improvements in the texts written at measurement times 2 and 3. Therefore, we will have to reflect on reasons that might be responsible for this outcome.

First, it appears worth repeating that we know from the preceding diagnostic study that perspective taking and coherence management abilities are irrefutably strongly correlated to the resulting quality of texts, even though there is a considerable distance between the cognitive nature of the predicting abilities and the mainly linguistic characteristics of texts. It is this essential finding that gave rise to our intervention. Over and above that, however, we learned that the following aspects might be responsible for the effect of the intervention failing to appear (note, however, that compared to the control group, the intervention has also not been detrimental):

- *Testing and writing tasks may have been too different from the learning tasks in the intervention materials*. If the measures taken after an intervention closely resemble the tasks and exercises used during the intervention, a training effect is likely to appear, but may be trivial. On the contrary, we probably intended to bridge a too long distance of transfer. Even if the students' understanding of coherence generation and perspective taking improved from the lessons, they would have needed more and further instruction on how to implement these insights in the texts they wrote. Our learning materials were mainly concentrated on the instruction of perspective taking and coherence management as ability components important for text production. However, the exercises possibly did not go far enough to show how to use these ability aspects for the concrete planning and formulation of reports and argumentations. – Alternatively, we may have failed to analyze the texts written after the intervention in a way that would detect any traces of improved coherence management and perspective taking. The analyses of the detailed analytical ratings are not yet completed.
- *The intervention may have focused too much on cognitive abilities and failed to sufficiently teach the corresponding linguistic means*. We intended to direct large parts of the training to the cognitive conception of the abilities in focus, particularly in order to provide, as far as possible, equal opportunities for the students with mother tongues different from German. In order to become visible in a written text, however, any skill needs to be accompanied by the corresponding linguistic means. In classes with a great heterogeneity with respect to target language proficiency, it is a huge didactical challenge to combine writing education with language training. Interestingly, while there is ample research on planning and revision activities in

writing, formulation processes are less frequently addressed (Bachmann & Becker-Mrotzek, 2017; see already Alamargot & Chanquoy, 2001).

- *Students may have been overstrained by the self-learning materials*. Working independently with a self-learning program requires good self-regulation skills. It is possible that students, particularly in grade 5, did not have sufficient preparation or practice for such a working strategy. If this assumption were true, it was not enough that the teachers in our intervention introduced and supervised the learning units; instead a more active and differentiated assistance of the students when working through the materials, and when comparing the own working results to the solution sheets, would be necessary. Note, however, that any increases in teacher activities will also enhance the behavioral variance between them, which may have an effect on the internal validity of the study.

Generally, intervention studies in the educational field must find a proper balance between internal and ecological validity. With respect to standardization, it is more advantageous to run training studies outside of the regular curriculum, at best under lab-like conditions. In contrast, we intended to design our intervention in a way that would enable full integration into regular school and classroom practice. Nevertheless, we are afraid that with our decision in favor of a self-learning program, we put too much concentration on matters of standardization and internal validity, at the same time neglecting important conditions that possibly would have been necessary, or at least supportive, for the intended effects of coherence management and perspective taking on text quality to occur. In future intervention attempts, we will need to put more emphasis on a concept that carefully considers and triggers the essential learning as well as teaching activities (see section 4.3 below).

One concession to the ecological validity, on the other side, was that we had to prepare materials that would fill the time of the lesson, but at the same time we had to make sure that all students (including the weaker learners and writers) would finish the relevant instructions and exercises on perspective taking and coherence management. This was achieved by an optional writing task at the end of each learning unit that was related to the subject matter of the respective lesson. For example, at the end of unit 2 that dealt with temporal conjunctions, students were invited to write a contribution to the Scriptorian newspaper about their typical daily school routines. In this context, a relevant objection can certainly be that the students with higher abilities and better writing skills will be able to work faster, start earlier (or more often) to tackle the optional writing task, and, thus, have even more learning opportunities than the weaker students – who would need learning opportunities more urgently. But this is a concession to ecological validity that we did not manage to avoid. At least, we were able to verify that the presumed effect did not end up in a Matthew effect on text quality: The gap between weak and strong writers did not become bigger from the pre-test to the follow-up measurement.

Finally, one further objection may point at the common practice that teachers of intervention classes must be willing to collaborate with researchers, to make their instructional activities observable, and to comply (at least to a certain degree) with the principles of the intervention (see also Koster & Bouwer, 2018). Such a positive selection may come along with above-average motivation and interest, which threatens internal validity by offering alternative interpretations of why a certain intervention has been successful. In the case of our intervention, however, we observed that teachers rather differed with respect to how intensely they motivated their students to work on the units and to tackle the optional writing task towards the end of the period: While some teachers were dedicated and attentive, others enjoyed that they did not have to prepare the lesson. At least, however, all participating students worked on the obligatory parts of the learning units (controlled by the use of an attendance list).

4.3 Outlook: From self-learning materials to a teaching concept

According to Graham and Harris' 12th recommendation for high quality writing intervention research (2014, p. 114) , it is advisable not to give up too early. In addition to the problematic aspects of our intervention study that we have discussed in the previous section, we particularly learned that we should not underestimate the role of reading abilities. It is difficult to improve writing skills in the presence of possibly insufficient reading skills, especially when a self-learning program is used that inevitably needs reading. Therefore we developed and wrote out an elaborate teaching concept of eight lessons to be administered by the teacher, based on the existing eleven units, and including a detailed course plan of the lessons, corresponding didactical explanations, teaching materials and a learning booklet. Now, the teacher gives and explains all instructions regarding the tasks (that still follow the didactical principles described in section 3). The teacher subsequently monitors and assists the students, and ensures a recapitulation of the working results at the end of a lesson. This new study has recently be completed. When the time comes to describe this follow-up intervention, we will be able to provide a detailed analysis of the involved teaching activities as well.

Acknowledgements

The reported intervention was supported by a grant from the German Ministry of Education and Research (BMBF; grant number 01GJ1208 A/B) to the first and last author. Information about the project may be obtained (in German) from <www.bmbf.schreibkompetenz.com>. The intervention and the related data collection were approved by the School Authorities of Lower Saxony and North Rhine-Westphalia, respectively.

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