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Psychology and the teaching of writing in 8000 and some words

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This article is focused on empirical studies on factors that may facilitate the effective learning and teaching of writing. Three domains of psychological oriented writing research are presented: writing processes, learning to write and writing to learn. First, some results from cognitive psychology focusing on writing processes (e.g. Bereiter & Scardamalia, 1987; Hayes & Flower, 1980), individual differences (e.g. Galbraith, 1996) and the relation between processes and text quality (e.g. Breetvelt, Van den Bergh, & Rijlaarsdam, 1994) are reviewed. Results showed that writing is indeed a complex activity and that a large variation is represented in writing processes and in the effectiveness of these processes. Second, some studies in the field of referential communication about learning to write are presented (e.g. Couzijn, 1995; Holliway & McCutchen, 2004). The major conclusion is that acting as a reader, and observing reading processes (e.g. of texts similar to the text the writer had to write or wrote) are very effective learning activities that contribute to writing skills. Next, attention is paid to the effective ingredients of observational learning in learning-to-write instructional sequences (e.g. Zimmerman & Kitsantas, 2002), and to individual differences in observational learning (e.g. Braaksma, Rijlaarsdam, & Van den Bergh, 2002). It is found that when students observe writers at work (models), it has larger learning effects than when they write texts themselves. Results also showed that depending on the proficiency of the writer and the newness of the task, reflecting on weak models and good models may have different learning effects. After that, attention is directed on (individual differences within) writing to learn: the paradigm in education that builds on the assumption that the act of writing can support learning (e.g. Klein, 1999). Finally, some issues where psychology could contribute to the teaching of writing are presented.

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In this article, we offer a journey through some empirical studies of factors that may facilitate the effective learning and teaching of writing. We will try to highlight some of psychology's contributions to writing pedagogy, mostly focusing on the secondary school age range. We will concentrate on three domains of psychological oriented writing research: writing processes, learning to write and writing to learn.

Our aim is to provide an overview of these domains and to infer consequences for the teaching of writing. This overview is necessarily selective because of the very large body of research since 1980. Obvious limitations of this overview are set by the research paradigms and our personal selections. We focus on cognitive and social-cognitive studies, disregarding motivational processes. Within the social-cognitive paradigm, we limit ourselves to referential communication and observational learning.

First, we present some results from cognitive psychology focusing on what writing processes entail, the relation between cognitive activities and the different configurations over processes, and the relation with the quality of the resulting product – text quality. We will also pay attention to task and personal variables that have an impact on writing processes. Then we move to the field of referential communication, from which we selected fundamental and educational applied studies showing that those learning to write can learn a lot from reading processes – observing readers or being a reader yourself supports the development of superordinate awareness of how texts work and what features in texts support the pragmalinguistic effect. A necessary ingredient for learning situations is the creation of a communicative situation where writers and readers meet and possibly change roles. The next field we move on to is social-cognitive psychology, in particular studies on the learning activity 'observing'. Here, the learner does not change roles (writer-reader) as in the referential communication studies, but observes learning-to-write activities of others instead of practising these activities themselves. We pay attention to the effective ingredients of observational learning in learning-to-write instructional sequences, and to individual differences. Having addressed learning to write, we then explore the field of writing to learn; the paradigm in education that builds on the assumption that the act of writing can support learning. The point we will make is that this field needs more attention from psychological research. Finally, we emphasise the desirability of new contributions from psychology for the teaching of writing.

Cognitive psychology and the study of writing

To introduce the essence of writing, we refer to Kellogg's assertion that writing is essentially a form of thinking, '[. . .] the study of writing as a window to theory of thinking' (Kellogg, 1999, p. 16), requiring mental effort and engagement. Writing a text demands *mindfulness* and *effortful engagement*; writers must monitor and evaluate how well thinking and writing is going. From secondary task analysis, Kellogg collected data about cognitive effort in various tasks (**Fig**. 1).

Data were gathered during task execution (writing, reading, learning or playing chess). At randomly chosen moments, a tone was played and students were required to react to indicate that they perceived the tone (e.g. by pressing a certain key). The reaction time indicates the amount of effort involved in the task at hand: the longer it takes the participant to react, the more involved she was. The results are clear: for undergraduates the three writing activities require as much effort as selecting a move for expert chess players. This secondary task methodology has been successfully implemented and developed (for overviews: Olive & Levy, 2001; Torrance & Jeffery, 1999).

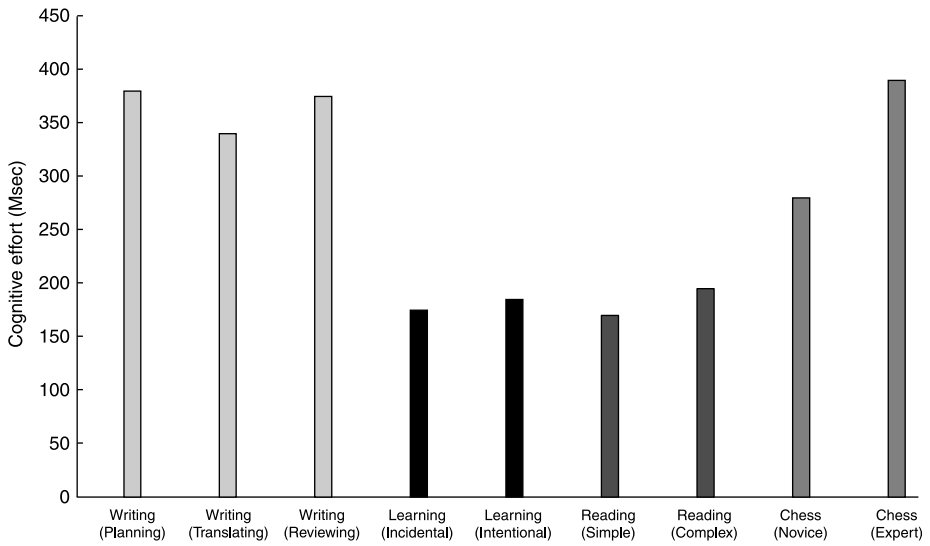


Figure 1. Cognitive effort for writing and other cognitive operations as indexed by interference with secondary-task reaction time in milliseconds. Adapted with permission from Kellogg (1999, p. 17).

Writing is not just effortful, but also complex. The frequency of the use of the formulae 'writing is complex' or 'writing is a complex process' has flattened the idea into a cliché in researchers' and teachers' discourse about writing (Google hits, respectively, 1120 and 535 hits, 8 January 2005). This cliché results from the relatively large body of research on the writing process, on the components of the writing process, and the relations between the components. Major contributions were made by two duos, John Hayes and Linda Flower (at Carnegie Mellon, Chicago, in those days) and Carl Bereiter and Marlene Scardamalia (at OISE, Toronto). Hayes and Flower designed the well-known Hayes-and-Flower model (1980), updated by Hayes in 1996 (Hayes, 1996). Their approach came from cognitive psychology, and was inspired by Newell and Simon's (1972) more general problem-solving model. Hayes and Flower applied the more general problem-solving model to writing, and applied the thinking-aloud methodology to writing processes. They also borrowed the expert-novice paradigm to reveal the differences between novice and expert cognitive behaviour. Although their model encompasses all kinds of writing processes, the model is widely perceived as an expert model, a perception we do not share: the model contains and relates all relevant processes and subprocesses, and it depends on the constellation of the monitor setting which of the potential subprocesses play a role in the course of the process (see Rijlaarsdam & Van den Bergh, 1996, for the monitor parameter setting hypothesis).

Bereiter and Scardamalia's (1987) work, on the other hand, comes from experimentation and fits in a cognitive developmental paradigm. Their central question is:

> Is writing basically the same process for beginners, with a few parameters set differently, or does it follow a qualitatively different mode? (Bereiter & Scardamalia, 1987, p. xiv).

They pursued this question through comparative studies of older and younger writers, and skilled and less skilled writers of the same age. They concluded that mature and immature writers differ in the structure of the writing process. They designed two different models of writing; the complex knowledge transforming model, where

content and rhetoric situation interact, and the simple knowledge telling model, a memory dump model, which leads to associative chains of content in texts.

> Expertise comes from subordinating the simple strategy to another that is a great deal more complex. (Bereiter & Scardamalia, 1987, p. xx).

For a thorough review of these and many more models, we refer the reader to Alamargot and Chanquoy (2001). Here, we limit our excursion to some studies, mostly within the framework of the Hayes-and-Flower model.

Writing processes: Activities distributed over time

From the Hayes-and-Flower model (1980), we distilled the main subprocesses, and applied them to think aloud protocols, revealing the writing processes of 15-year-olds writing a documented argumentative essay (writing time varied from 60 to 90 minutes). The occurrence of a process was related to the quality of the resulting text (Breetvelt *et al.*, 1994).

A limited set of cognitive activities proved to be sufficient to explain the quality of the resulting text (Table 1), but not without taking process time into account. For none of the activities does it hold that the more frequent, the better the text quality during the whole process. Some activities contributed to text quality in the same direction (positively or negatively) during one or two phases, some in reverse directions – positively in one phase, negatively in another. As illustration, we present the correlations between the frequencies of two cognitive activities ('reading the assignment' and 'generating') and text quality at various moments during the writing process (Fig. 2).

'Reading the assignment' is positively related to text quality only during the initial stages of the writing process. During later stages, the correlation between this activity and text quality becomes negative. The correlation between 'generating' and text quality also changes during the writing process. It increases during the initial phases and reaches a maximum in the middle of the writing process to decrease during later stages.

Table 1. Summary of regression weights per writing episode: the relation between occurrences of cognitive activities and the quality of the resulting text (+ positive relation; − negative relation; blank (no significant) relation). Adapted with correction from Breetvelt *et al.* (1994)

	Writing process episode		
Cognitive activity	1	2	3
Reading writing task and documentation	+	−	
Self-instructions			+
Goal setting	−	+	+
Generating ideas		+	
Structuring	−	+	
Meta comments		−	
Pausing		−	
Writing/Text production			+
Rereading text			+
Evaluating text	+	−	
Revising text	−	−	

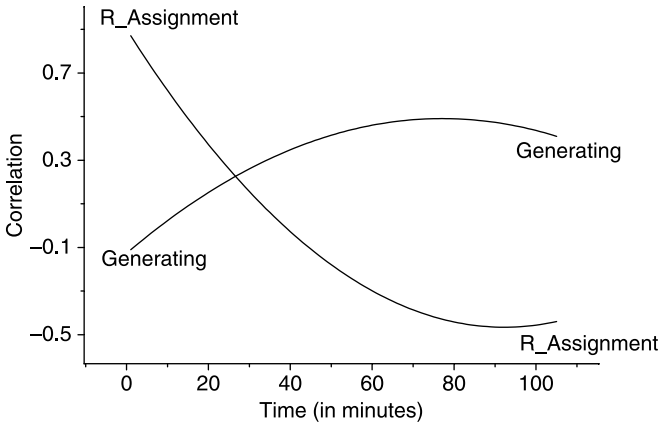


Figure 2. The temporal distribution of correlations between text quality and two cognitive activities: 'reading the assignment' and 'generating'.

Issues in writing process research

An important issue was introduced by Whitaker, Berninger, Johnston, and Swanson (1994) in an experimental study and is now addressed in writing process studies – the interaction or cooperation between cognitive activities. Whitaker *et al.* (1994) studied to what extent various components of the writing process were connected. In their study, primary school children (fourth to sixth grade) performed a sequence of tasks, each representing a particular component of the Hayes-and-Flower model (planning, translating and reviewing).

Texts were scored for three levels of language: (a) word (frequency, indicating lexical access: less frequent words better than more frequent words); (b) sentence (complexity); and (c) text (organization). Two important results were reported. First, word, sentence and text skills were found to be independent. Within the translating or reviewing task, no correlations were observed between the three language level scores. At the same time, high correlations were found between task-score on the same language level (word: $r = .84$; sentence: $r = .77$; text: $r = .84$). Secondly, no significant relations were observed between the quality of planning and the quality of translating or reviewing.

From think-aloud studies with older students aged 14 to 15, we learnt that the coexistence and cooperation of cognitive activities do exist, and that the cooperation is time dependent. In other words, cognitive activities are functionally related; moreover, these relations change during the process (Van den Bergh & Rijlaarsdam, 1999). In Fig. 3, the distribution of various adjacent pairs of activities is depicted, with in each case generating as the second member of the pair. All five combinations of generating activities have different patterns of distribution. This implies that the different combinations behave differently, indicating a functional relationship. If the combinations were just random adjacent pairs, then the distributions over the process would have overlapped.

The effect of functional pairs varies over time. Some functional pairs are more effective in the beginning of the process, others in a later phase of the process (Fig. 4). For instance, from Fig. 4 it appears that the correlation between 'translation-driven-generation' (TRDG) and text quality is time dependent. The correlation is significant in the first quarter (negative) and after (about) 25 minutes until (about) 75 minutes, where

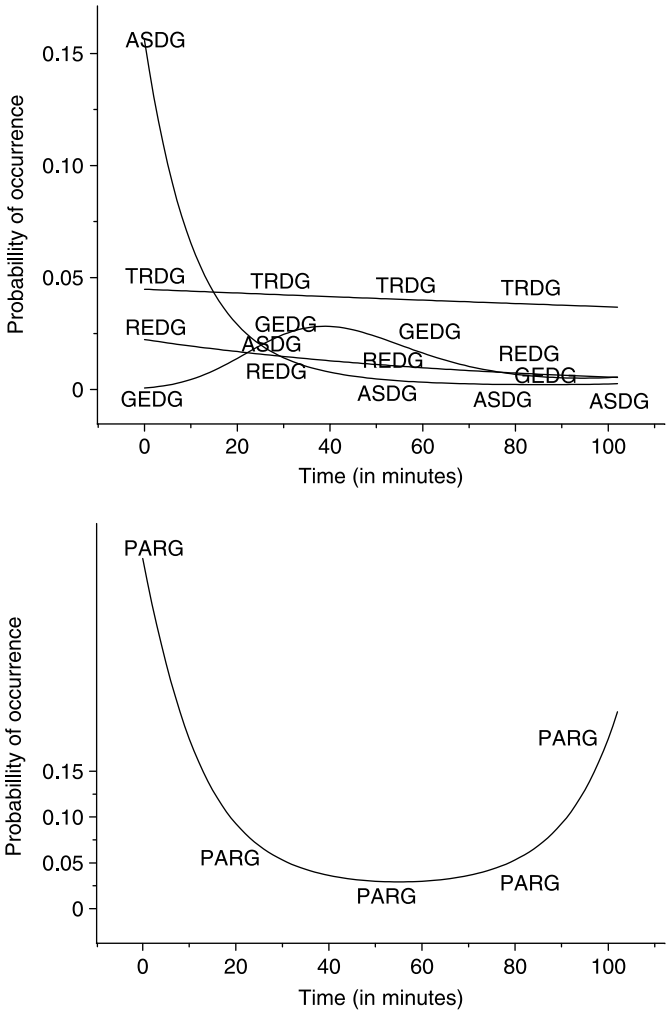


Figure 3. Five combinations with generating. Changes in the mean probability of occurrence (*y*-axis) of five combinations, generating being the second member of the pair. Left-hand panel: assignment-driven-generation (ASDG), rereading-text-driven-generation (REDG), translation-driven-generation (TRDG), generation driven generation (GEDG); right-hand panel: pause-related-generation (PARG). Data from Van den Bergh and Rijlaarsdam (1999).

it is positive. After (about) 85 minutes, it reaches significance again, but now it is negative: the more this activity occurs during the end of the process time, the weaker the text.

This observation leads to a reconsideration of the unit of analysis for theory building. When combinations of cognitive activities behave as functional relations, then strings rather than single activities should be considered as the unit of analysis.

Writer variables influencing writing processes

A student's ability in applying a cognitive activity (planning, revising) affects the amount and effect of this activity positively. Van der Hoeven (1997), in her study on writing processes of 11-year-olds, measured revision skills with special, independent tasks.

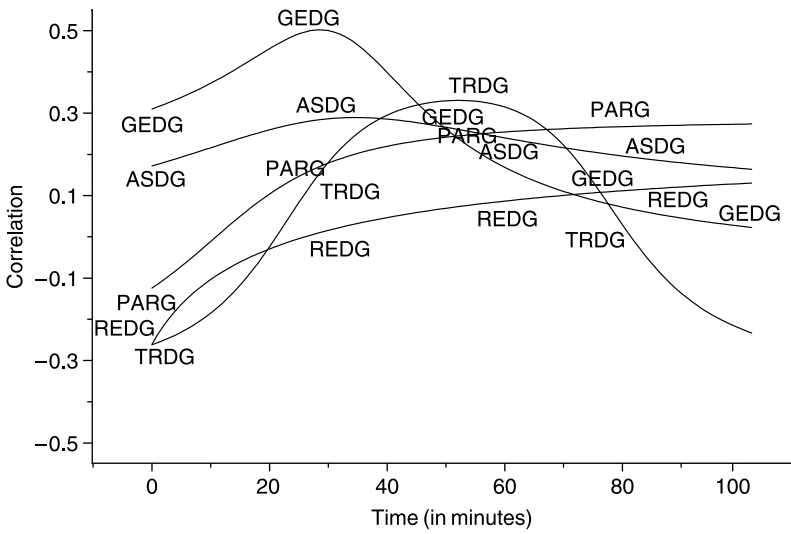


Figure 4. Correlation (*y*-axis) between occurrence of assignment-driven-generation (ASDG), rereading-text-driven-generation (REDG), translation-driven-generation (TRDG), pause-related-generation (PARG), generation-driven-generation (GEDG) and text quality over writing process time (*x*-axis). Data from Van den Bergh and Rijlaarsdam (1999).

She found that revision skill was positively related to most other cognitive activities appearing in the writing-aloud protocols: structuring, production of written text, rereading, evaluating and transforming already-written text. The higher the student's competence in evaluating already-written text, the more instances of rereading, evaluating and transforming were observed, and the better the resulting text.

Level of skill affects the distribution of activities over the process

In Van der Hoeven's study (1997), participants with low revision skills generated fewer ideas in the beginning of the writing process compared with participants with relatively high revision skills scores. While the number of ideas gradually decreased in the high revision skills group, this number increased in the low revision skills group. Students with high revision skills reread, evaluated and revised relatively little in the beginning and more towards the end of the writing process. These findings suggest that the quality of revision (revision skill) is related to the way the writer organizes the writing process, and thus affects the quality of the resulting text.

Skill in cognitive activities is not enough: The effect is in the implementation during the process

Interestingly, the competence of evaluating already-written text was, in itself, negatively related with the quality of text. Only by employing writing process activities of revision did this negative relation change into a positive relation: the skill itself is not sufficient; writers have to apply the skill when they write (Van der Hoeven, 1997). This observation indicates the hierarchical embeddedness of skilful processing.

Writing styles preferences and writing processes

David Galbraith and Mark Torrance were involved in the most prominent empirical research on the relation between personality and writing. They tested the assumption

that different writers perform better under different circumstances. They expected a difference between the writing processes of *high self-monitors*, who control their expressive behaviour in order to present themselves desirably to others, and the writing process of *low self-monitors*, who express their affective state directly. Galbraith (1996, 1999) set up experiments that examined the ways in which writers generate ideas to write about. Undergraduate students (both high and low self-monitors) either wrote an essay (without making a plan on paper) or made notes in preparation for an essay (without actually writing the essay). As seen in **Fig. 5**, Galbraith found that high self-monitors produced more new ideas when they made notes in the planning phase, and low self-monitors produced more ideas when they wrote texts. Thus, for discovery, writing without planning is useful for some writers and planning texts is useful for others.

Kieft, Rijlaarsdam, Van den Bergh, and Galbraith (2005) studied the effects of writers' process tendencies on the effects of two different interventions focusing on learning to write short book reviews by students aged from 16 to 17. One intervention aimed to support students who were planners and high self-monitors, the other intervention aimed to support revisors and low self-monitors. The researchers observed that students with relatively high scores on a planning writing scale or on a revision scale profited significantly more from the planning intervention, while students scoring low on one of these scales were better off with the revision learning condition. These results might indicate that students with relatively weak developed writing styles (*monitor configurations* in the Hayes-and-Flower model) should first strengthen their revision skills (analysing their first drafts as a stepping-stone for a final draft) before they should invest in learning to plan first drafts.

Task variables that affect processes

Rau and Sebrechts (1996) studied effects of different kinds of planning. Their main idea is that planning serves two different goals: *options expansion* and *options resolution*.

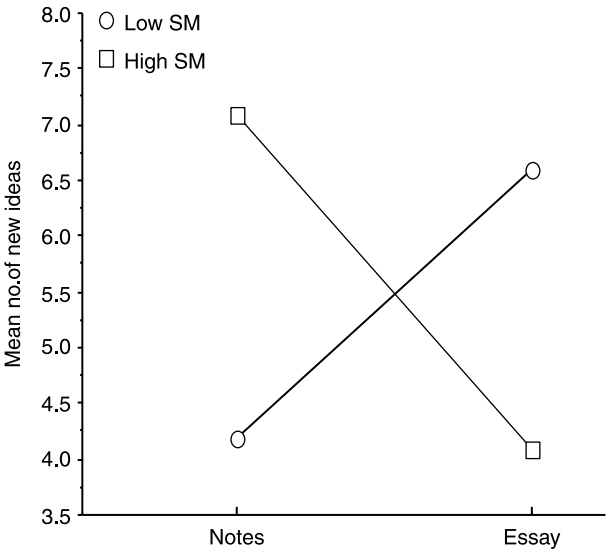


Figure 5. Mean number of new ideas produced after writing as a function of self-monitoring (SM) and mode of writing (Galbraith, 1996, p. 129).

Undergraduate students performed a 30-minute writing task. There were three planning conditions: no planning (immediate writing), silent planning (5 minutes, no written planning) and outline planning (5 minutes).

The results show a clear distinction between the two planning conditions, indicating that writers adapt their process to the particular situation. Writers compensate for different starts during the on-line writing process, in such a manner that the resulting text quality is not affected by different start situations. When writers can spend time on content planning, without much support to organize these ideas, they increase the numbers of options they have to resolve during writing. They pause longer, as an indication of content planning, and most of their revisions are content revisions. Writers who have the opportunity to organize their ideas, in the outline condition, show more conceptual planning during that pre-writing phase than silent planners. They not only generate options, but already start in the pre-writing phase with *options solutions*, while the silent planners delay the process of option resolving until the writing phase. This study indicates the compensatory power of processes; different task situations lead to different processes and resulted in same quality of text.

What do we learn from writing process studies: Is it complex or is it complex?

In writing process studies, we only have access to the tip of an iceberg. The more we know, the more complex the writing process seems to be. The more we know, the less straightforward the relation with teaching is. Nevertheless, we will list some issues from the review we have presented that could serve as heuristics when designing writing instruction.

(1) In a group of students, a large variation is represented in processes and in the effectiveness of processes. This variation could be used as a resource for teaching writing.
(2) Many paths lead to a good text. Writers compensate for less developed skills. Variation in instructional content and approaches is needed to build on strong developed capacities, and to develop weaker skills or strategies.
(3) Not all students exploit the relevant cognitive activities: they must become aware of their existence and effect and they must have opportunities to practise them.
(4) Not all students launch the relevant activities at the appropriate moment. Students must experience what is effective at what moment and they must understand the weak elements in their patterns of activities.
(5) The *quality* of planning, generating, structuring and revision skills plays a positive role in writing processes and as a consequence on text quality. We must teach students these skills and they must practise them in productive and complex situations.
(6) Students must learn to guide and monitor their processes. They must build task schemes (Hayes, 1996). This requires practise and reflection.

Psychology and the study of learning to write: Referential communication

Within the domain of referential communication, writing is seen as a cognitive and social process. First, there is the cognitive task to decide about what information to communicate and how to communicate it. This implies that a writer must coordinate two representations of the text: the communicative intent (what do I want to say?) and the representation of the text produced (what have I written?). Both representations interact; that is, the act of writing may affect the thoughts of the writer, and the text may

take the writer on an unexpected track of thoughts, reasons and arguments. Additionally, writers must consider the context of the writing and for whom the writing is intended. This social task requires that writers construe a third representation of the text, the reader's perspective ('how will the reader interpret my writing?').

Writers reading as readers

Holliway and McCutchen (2004) explored whether young writers would benefit from reading as the reader. A concrete experience like reading as the reader may help young writers begin to coordinate 'what I want to say' and 'what I have written' with 'how my reader interprets my writing.' (Holliway & McCutchen, 2004, p. 93). Writers participated in three 30- to 45-minute writing sessions. In the first session, all writers were given three tangram figures to describe (see Fig. 6). In the second session, each writer received a typed version of the descriptions they composed in the first session. Writers were randomly assigned to one of three perspective-taking conditions.

In the feedback-only condition, writers were asked to revise their original descriptions. In the feedback and rating condition, writers received three descriptions written by other students and rated the descriptions on informational adequacy. They then revised their own descriptions. In the third condition, feedback and read-as-the-reader, writers were asked to read three descriptions written by other students and match descriptions with tangrams (a task identical to their readers' task). Writers then revised their original descriptions.

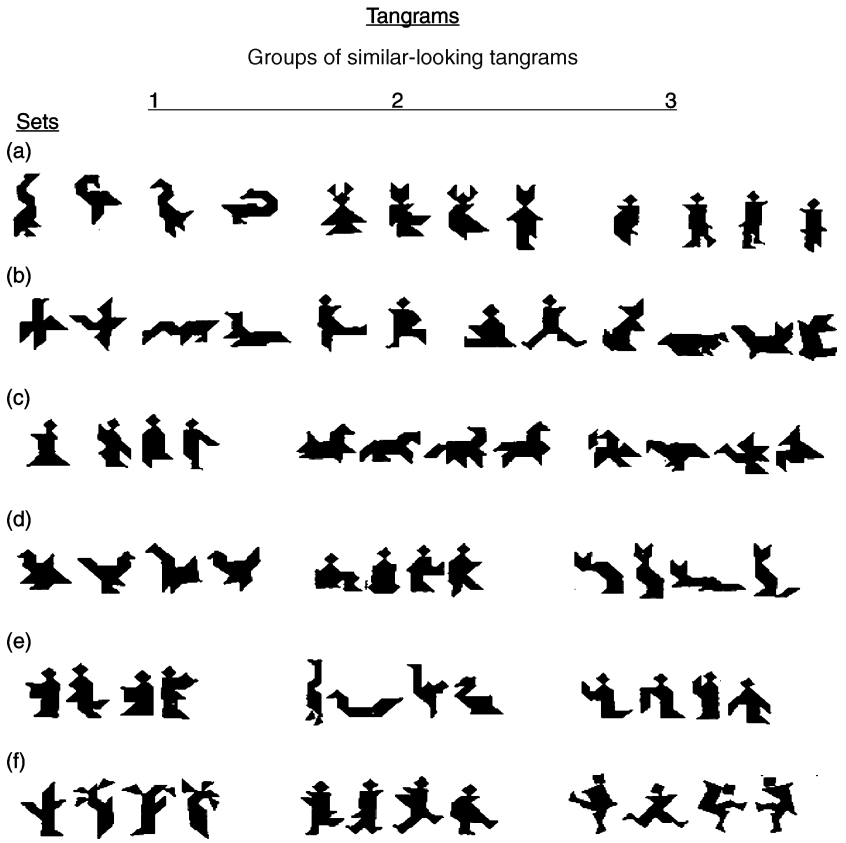


Figure 6. Groups of similar looking tangrams (Holliway & McCutchen, 2004, p. 95).

In the third writing session, writers composed descriptions for tangrams they had not previously seen. Each set contained three separate groups of four similar looking tangrams (see Fig. 6). Each group contained one 'targetgram' and three distracters.

For both grades, the read-as-the-reader condition gained significantly in revising their tangram descriptions and writing descriptions for a new set of tangrams – perspective-taking supports the development of writing ability (see Fig. 7).

Note that the rating condition did not work well; rating texts for adequacy failed to support the improvement of skill, except for new tasks in grade five. The problem might have been that students lacked a frame of reference to evaluate adequacy, while in the condition read-as-the-reader students compared a written description with the object and the distracters and then constructed a frame of reference.

Writers experiencing the reader

Another approach within the field of referential communication was reported by Michel Couzijn (Couzijn, 1995; Couzijn & Rijlaarsdam, 1996; Couzijn & Rijlaarsdam, 2004; Rijlaarsdam, Couzijn, Janssen, Braaksma, & Kieft, in preparation). He did not rely on the role change between being a writer and being a reader as Holliway and McCutchen (2004) did, but studied the effects of being confronted with real readers.

His question was, Do children develop knowledge about effective communication from experiencing how communication works? One text type with a strong, overt communicative effect is a manual. Therefore, he took a simple physics experiment, trained children to perform this experiment and let them write a manual and then experience the effect of the manual.

The sequence of acts and states in the physics experiment was as follows (see Fig. 8). First, one takes an Erlenmeyer flask, puts a cork with a hole on the flask and then puts a funnel in the hole. Then one puts some water in the funnel. The water does not flow from the funnel into the Erlenmeyer, the air in the Erlenmeyer needs space and will not

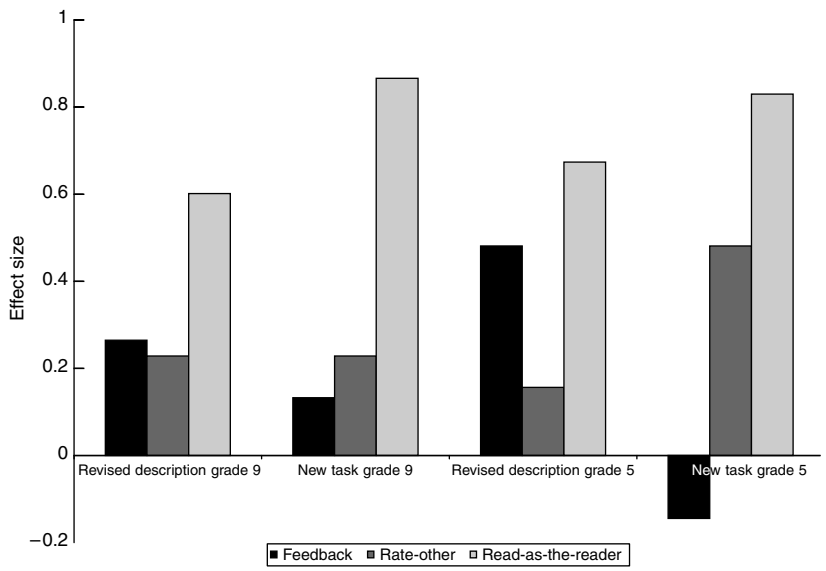


Figure 7. Effect sizes for three conditions, two tasks, two grades.

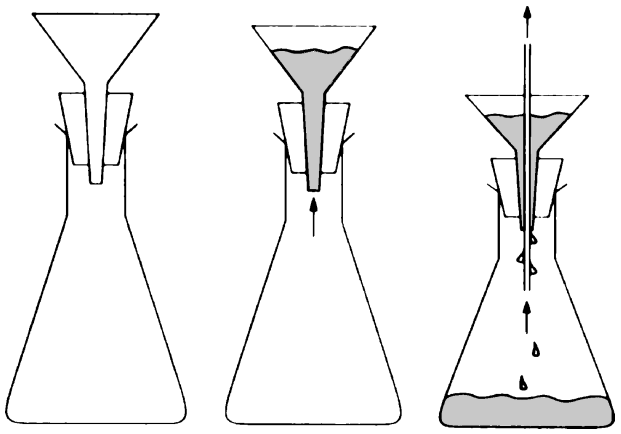


Figure 8. Three stages in the physics experiment to prove that air occupies space.

let the water in. Then, one puts a straw into the funnel, keeping a finger upon the top. Nothing will happen because the air cannot escape. However, when the finger is lifted, the air can flow out through the straw and then the water will flow into the Erlenmeyer along the straw.

Couzijn individually taught the children how to perform this physics experiment. Present on a table were several Erlenmeyers of different sizes, various corks of different sizes with holes of different sizes and funnels and straws, also in different sizes. Only one combination fitted well. He showed students the experiment step-by-step and added the physical explanations. Then, he coached the student to do the experiment unassisted, until the student performed the experiment well. Ultimately, the student was able to carry out the experiment perfectly. Then, students were asked to write a manual for a classroom peer. The manual should be sufficiently clear that the reader could perform the experiment perfectly. This is an example of such a manual:

> You know that when something has air in it, for instance, a bottle, and that thing is closed, no air can go out. For instance, you take a bottle, cork in it, funnel in it, and you put water in the funnel, no water comes into the bottle, because the bottle is closed, no air can go out.
>
> As soon as you put a straw in the funnel, the air can go out from the bottle via the straw and then the water can enter the bottle. Do it!

The written manuals were input provided for other students (who were not involved in an earlier stage of the project) when they were invited to perform the experiment, using a student manual, while thinking aloud. Their performances were videotaped. Three weeks after the writing session, the writer was shown two of his readers on video. Most writers were shocked when they saw their readers at work. Some saw the readers of their own text, some saw readers of texts written by other writers, where some had access to written comments by readers and others did not this kind of extra support. Then, the student received his or her original text, with the request to rewrite or revise it.

The quality of the manuals resulting from various learning conditions was assessed. Figure 9 presents the results of several experimental conditions in which students rewrote their first version after having been exposed to readers' processes on video. All three reader-observation conditions scored significantly better than the first versions and the first versions/rewriting conditions.

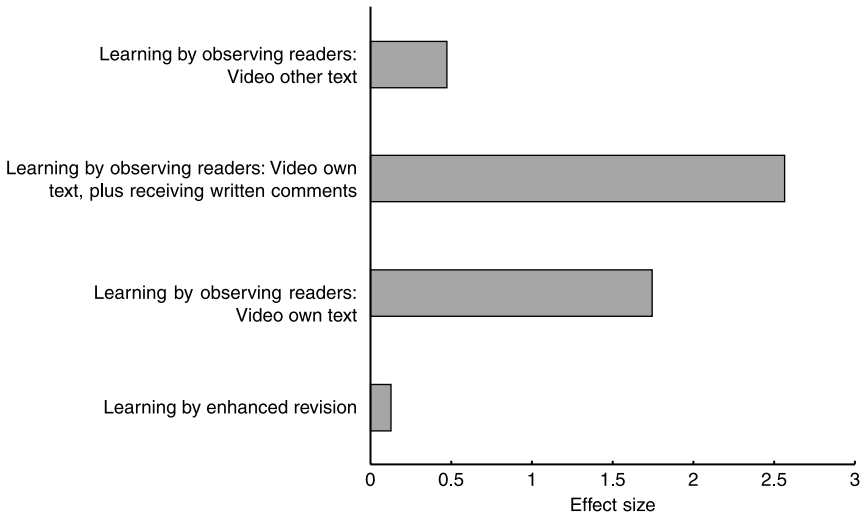


Figure 9. Pre- and post-test effect sizes for four experimental conditions.

Another 3 weeks later, all students wrote a letter of advice to a new classmate, about how one should write a manual, assessing students' knowledge about the manual as text type, as a prerequisite for transfer to other 'writing-manual-situations'. Students from the reading-your-own-manual condition produced significantly more pieces of advice than students form the other conditions.

These results indicate that young writers are capable of deducing knowledge about a good text. They can build a set of criteria for a good text and they can apply these criteria. Observing reading processes is a significant learning activity that may contribute to the writing learning gain.

Learning to communicate: Participating or observing

In the 1980s, Sonnenschein and Whitehurst, in a series of studies, studied the effect of being an observer of communication on referential skills, being interested in the transfer of listening to speaking and vice versa. They hypothesized that a lack of transfer between the two roles may be attributed to a lack of metacommunication, which is a more abstract skill than speaking or listening. Observation of speakers and listeners in communication tasks would result in metacommunicative knowledge, which will influence the speaking and listening skills. Conversely, being trained in a speaker's or a listener's role will not transfer to the complementary role, nor to a higher order skill like critiquing communication (see Fig. 10).

Sonnenschein and Whitehurst (1984) implemented a referential communication task; speakers (6-year-olds) had to describe one triangle from a pair so clearly that the listener (a doll in this case) could identify the triangle correctly. In the listening role, students listened to the doll referring to one of the triangles, and had to decide whether they could identify the triangle, or that the message was not clear enough. In one condition, the participants played the listener and the speaker roles; they were participating in the communication. In the other conditions, participants observed two dolls playing the game, and had to decide whether the listener could distinguish the triangle or not, and had to decide whether speaker, listener or both were correct. The conditions varied in the activity (observation, evaluation), feedback on trials (yes/no) and the object of the activity (listener, speaker or both). As learning and transfer tasks, speaking skill, listening skill and commenting on others' performance were measured.

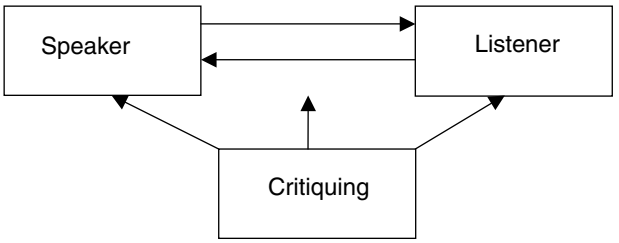


Figure 10. Sonnenschein-and-Whitehurst Critiquing Model (Sonneschein & Whitehurst, 1984).

This last task consisted of a series of observations of speakers as well as listeners, with the question whether the performance of each of them was correct or not.

The most striking result (see Fig. 11) was that observation and evaluation of both speakers and listeners – the complete communication – resulted in very high scores on all post-tests; the performance of speaking and writing tasks and the evaluation tasks. It is possible to acquire speaking and listening skills without practising these skills in the given situation and in others – the critical awareness is better than in the practising conditions. Observation of both roles without giving evaluative comments, however, yielded much smaller effects. Observation of only one role, either speaker or listener, yielded large learning effects, but no transfer effects, neither to the complementary mode, nor to the commenting tasks.

The researchers conclude that speaking and listening tasks are 'subordinated' to the commenting or evaluation task, in the sense that the student who masters the commenting task appears to master the speaking and listening tasks as well, but not vice versa. Moreover, they conclude that an effective acquisition of speaking or listening skill can be obtained by observation and evaluation of others performing such tasks. This study gives some important hints for effective learning activities: (a) intermodal transfer is not obtained by training in, or observation of, one group only, neither to the complementary communicative skill, nor to the commentary skill; (b) learning and transfer effects increase dramatically if the subject does add an evaluation of the observations.

Psychology and the study of learning to write: Socio-cognitive learning theory

Having considered the intricacies of writing processes and the remarkable results from referential communication studies, some contours of writing pedagogy emerge: observation of writers and readers can affect writing proficiency. Can we learn more from psychology about learning processes for writing when we concentrate on observation?

Observing as learning activity in learning-to-write situations

Albert Bandura has transformed behaviourists' insights into social cognition since the 1960s. Two of his followers, Dale Schunk and Barry Zimmerman, developed his theory of observational learning further, and applied it to a range of academic subjects including writing (see e.g. Schunk, 2000). We will present here a study published in 2002 by Barry Zimmerman and Anastasia Kitsantas. They based their study on Schunk and Zimmerman's social model of sequential skill acquisition (Schunk & Zimmerman, 1997; Zimmerman, 2000). This model claims that learners can acquire new writing skills optimally in four sequential levels.

(1) Observation: observational learning is the process through which information is obtained from watching models' actions, hearing their descriptions and discerning their consequences.

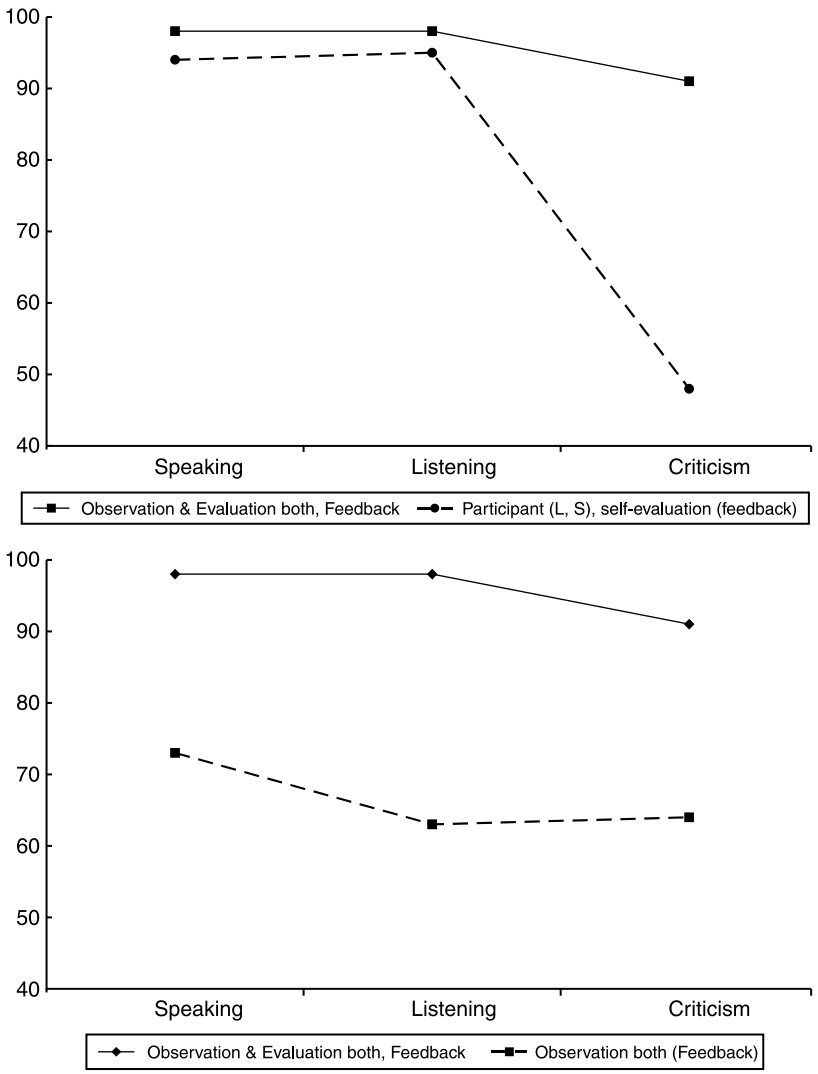


Figure 11. Differential effects of participant role and observation role (upper panel) and the additive affect of evaluation task upon observation task (lower panel). Based on data from Sonnenschein and Whitehurst (1984).

(2) Emulation: novices can learn to enact a model's performance; they have achieved this level of competence when they can emulate the general form of a model's skill.
(3) Self-control: students learn from self-directed practice to achieve automaticity in their behavioural technique. To attain this level of proficiency, observers must compare their creative effort with personal standards acquired previously from a model's performance.
(4) Self-regulation: students learn to adapt their performance to changes in internal and external conditions. They must shift attention from modelled processes to performance outcomes (e.g. reader responses).

Here, we concentrate on the first two levels. The authors studied the effects of the modelling and the practising level separately on complex sentence combining (Zimmerman & Kitsantas, 2002). Students had to combine kernel sentences into one coherent non-repetitive sentence. Kernel sentences were, for example: (a) he flew with the same inner control; (b) he flew through heavy sea fogs; (c) he climbed above them; (d) the climb was into dazzling clear skies; (e) every other gull stood on the ground; (f) every other gull knew only the mist. A correct solution would be: he flew with the same inner control through heavy sea fogs and climbed above them into dazzling clear skies, while every other gull stood on the ground, knowing nothing but the mist and rain.

A 5-step solution strategy was presented on a written hand-out (*ibid*. p. 662): (a) circle all of the words standing for new ideas in each sentence; (b) cross out the words that refer to the same thing; (c) combine all of the circled words into written phrases about the same thing; (d) number the phrases in order of importance; and (e) build the final sentence around the most important phrases and insert less important phrases where they belong using connecting words (e.g. *but*, *and*, *although*, *because*).

In the first learning phase, the observation phase, three conditions were distinguished. In the *no model* condition, students were confronted with nine problems on an OHP, and were invited to study them. In the *mastery model* condition, the participants observed an experimenter solving the nine problems without errors on the OHP. In the *coping model* condition, the participants observed an experimenter solving the same nine problems, making errors in the beginning but gradually reducing the number of errors. In second learning phase, the practising phase, students had to solve 12 problems individually. Half of the participants got feedback after each item; half of them got no feedback. Feedback was focused on strategy steps they performed properly (positive feedback).

The results were striking (see **Fig**. 12). Observing a model resulted in far better scores, where the students who observed a coping model outperformed those who observed a mastery model. The effect of feedback in the practising phase was also significant (main effect, no interaction with model condition).

In terms of effect size, both the coping model and the mastery model condition had a large effect compared with the no model condition. The coping condition had an extra large effect compared with the mastery model condition. When we add the effect of the second phase – practising – to the model effect (**Fig**. 12), it seems that the practising effect varied over the model conditions; the coping model participants, already scoring in the highest regions after the observation period, gained in the feedback condition far more than in the no feedback condition. The main effect of practising was about 0.52; small (0.25) in the no feedback condition, medium (0.77) in the feedback condition. The correlations between the observation phase and practise phase scores were very high (.90), which indicates that the effect of the observation phase predicted the result of the practising phase very strongly. This is a very interesting result: without any writing in the observation conditions, proficiency in writing was enhanced.

Compared with the observation studies we reported in the section on referential communication, one may note several differences. The object of observation is different now – it moved from observing communication (observing a reader's process) to observing a problem-solving strategy (observing a strategy to combine sentences). The input for learning changed from the communicative effect ('does the text meet its goal?') to the success of the sentence-combining strategy. The type of learning changed from open, constructive (students had to build their own mental model of what counts in

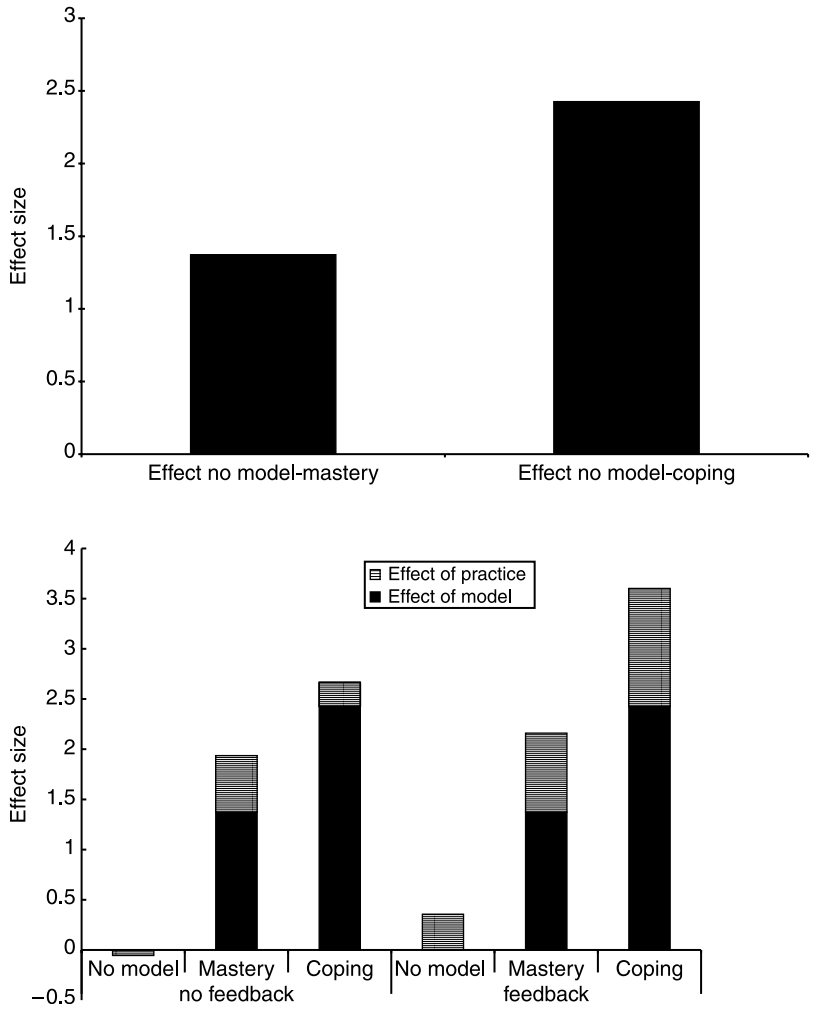


Figure 12. Effect sizes model conditions (upper panel) in combination with practice conditions (lower panel). Data adapted from Zimmerman and Kitsantas (2002).

successful communication) to closed and deductive (combining strategy is given, and application in different situations is trained). The type of models varied from peers (referential communication) to adults. Transfer of learning was an issue in some of the referential communication studies, but not in the Zimmerman and Kitsantas study. In both instances, testing the effect of observation as an effective learning activity in communication and writing was limited to a very short time. In the next section, we present an intervention study similar deductive as Zimmerman and Kitsantas' study, but with peer models, and with a longer duration and with a focus on transfer.

Observing as a learning activity that stimulates intermodal transfer

In the studies by Sonnenschein and Whitehurst reported in this paper, it was shown that observation activities induced intermodal transfer. We will present some related research examples, now on writing, with observational learning as the key element. In

these studies (Couzijn, 1995; Couzijn & Rijlaarsdam, 2004), students observed and evaluated learners in complex reading or writing tasks, and applied these learning activities in a sequence of 4 hours. Models observed were not experts, but peers with natural varying levels of expertise, videotaped during learning-to-write or learning-to-read periods. The learning sequence was deductive; students read about a strategy, observed, compared and evaluated the learning behaviour of two peers executing the strategy, and then moved to another strategy. Each of the four lessons on argumentative writing was devoted to a particular unit like 'argumentative texts are dialogical texts', 'patterns of argumentation' (subordinated or coordinated arguments) and 'rhetorical devices in argumentative texts' (reader oriented elements in introduction and closing part).

In the traditional conditions, students read some theory, checked their knowledge via a quiz, and then applied the theory in short writing tasks (writing condition) or reading tasks (reading condition). In the experimental observation conditions, students did not execute these exercises themselves, but watched on video how two peers performed such a writing or reading task. They had to choose which of the two peers on video executed the task the best and had to explain their choice.

In one of the lessons, students in the writing conditions learned to write an argumentative text from an argumentative scheme, using connectives to indicate the level of argumentation (subordinated, coordinated, main argument, subargument etc.).

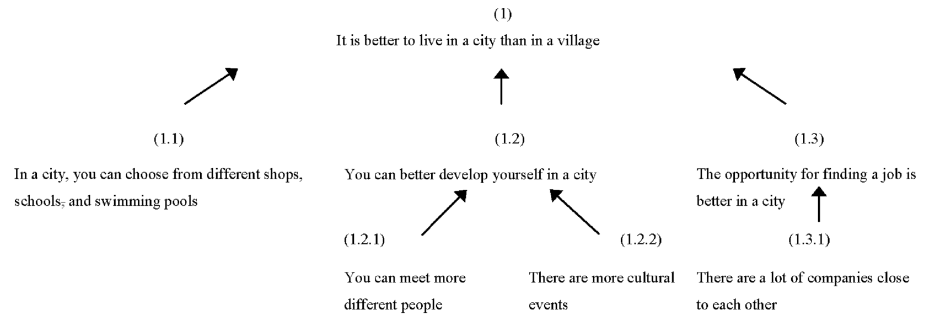
In the observation-writing condition, students did not write the text themselves, but were instructed to observe other students who performed the writing task (see Fig. 13).

In the reading conditions, students received parallel tasks as in the writing conditions – they did not compose a text from a schema, but instead transformed a text into an argumentative scheme. Dependent variables in the experiment (to measure learning effects and intermodal transfer effects) were writing and reading skills.

It turned out that observing other processes resulted in larger learning gains than executing the exercises yourself for writing as well as for reading. Observing writing had an effect of .78 standard deviation compared with the traditional writing condition; the effect for observing reading was 1.00 standard deviation. The transfer effect from observing writing on reading was enormous (.92), which indicates that observing writing tasks has more effect on reading skills than performing similar reading tasks yourself (Couzijn, 1995).

Individual differences in observational learning

In subsequent studies on the effect of observation, Braaksma and her colleagues found that students learnt especially well by the evaluation of writers at work and by providing arguments for the claim which of the two writers performed better than the other (Braaksma, Van den Bergh, Rijlaarsdam, & Couzijn, 2001). In addition, in a study in which we closely observed the observational behaviour of students, we learned that students are building their own mental solution before choosing which student did a better job (Braaksma, Rijlaarsdam, Van den Bergh, & Van Hout-Wolters, in preparation). Observers also performed (mental) executive processes and during the observations, they compared their own (covert) performance with the models' actual performances. In other studies on observational learning, we investigated whether instructional factors interact with learners' characteristics and whether observational learning affected the writing processes, as one may assume when meta-cognition is affected by the learning condition.



After watching the models, you have to answer the following questions:

1. Which model did less well?
2. Explain briefly what this (less good) model did worse.

When you have observed both models, you may advance to the next page.

Make your notes here, when you observe the models:

..... (…)

(next page booklet)

You saw two models doing the assignment. They wrote the following texts:

Model 1

It is better to live in a city than in a village because in a city, you can choose from different shops, schools, and swimming pools, you can better develop yourself in a city and the opportunity for finding a job is better in a city. Because you can meet more different people and there are more cultural events, you can better develop yourself. The opportunity for finding a job is better because there are a lot of companies close to each other. ~~Therefore~~ Therefore, it is better to live in a city.

Model 2

It is better to live in a city than in a village because firstly, in a city, you can choose from different shops, schools, and swimming pools. Secondly, you can better develop yourself in a city because you can meet more different people and there are more cultural events. Moreover, the opportunity for finding a job is better in a city, as there are a lot of companies close to each other.

1. Which model did less well? Model ...
2. Explain briefly what this (less good) model did worse.

Model ... did worse, because

..... (…)

Figure 13. Observation task in observation-writing condition. Adapted from Braaksma *et al.* (2002, p. 410).

To start with the first issue, there the question was: is it better to focus on a weak model, which makes mistakes, or on a good model, which processes the task in a better way? The answer is: it depends. It depends on the learner's proficiency level and the newness of the task at hand (Braaksma *et al.*, 2002). A weak writer acquires a new task the best by comparing two students (peer models) who are performing a writing task, focusing on the weaker model ('why did model X worse than model Y?'). When the task is not new any more, weak students learn also from performing the writing task themselves, but not from observing and then focusing on the better of the two models. For relatively good writers, the pattern is different. A good writer acquires a new task by performing the writing task himself, or by observing a set of models who perform the task, focusing on the good model in the set. However, when the task is not new any more, the good writer does not learn any more from performing the task, but only by focusing his observations on the

good model in a pair of good and weak models. These findings indicate a sequence starting with observing and focusing on the weaker of two models, then practising and then observing and focusing on the better of two models.

In another experiment, we applied the same learning tasks, implemented the same procedures, but this time, we measured the effects of the conditions on the orchestration of writing processes, using think-aloud protocols (Braaksma, Rijlaarsdam, Van den Bergh, & Van Hout-Wolters, 2004). Figure 14 illustrates the differences in orchestration due to instruction for two writing activities: goal orientation and analysis.

Compared with the control condition, the configuration of cognitive activities in the students in the observation conditions was more complex than the configuration of the

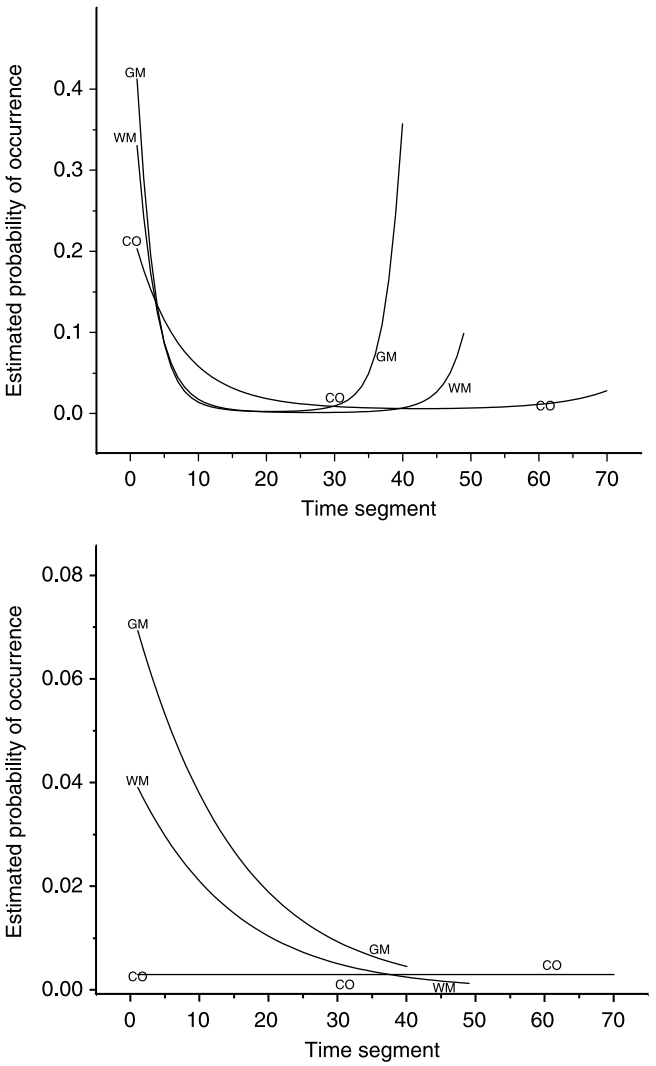


Figure 14. Orchestration of cognitive activities per condition (CO = writing control condition; WM = condition weak model; GM = condition good model). Upper panel: Goal orientation; lower panel: Analysis. Adapted from Braaksma, Rijlaarsdam, Van den Bergh, and Van Hout-Wolters (2004, p. 21).

students in the control condition, with more planning all over the process, and more analysis and less transcribing in the beginning than in the control condition. These differences in patterns relate to the quality of the resulting text – students who varied their patterns of cognitive activities over process time wrote better texts. It seems that both observation conditions stimulated participants to vary the orchestration of cognitive activities. However, Braaksma *et al.* (2004) nuanced this conclusion: the variation in patterns in the observation conditions is caused by some of the participants, not all. Thus, it seems that observation stimulates some students to modify their monotonous orchestration in more effective patterns, while other students were not affected, like the participants in the writing condition who did not change their monotonous patterns. Answering the intriguing question why some students changed their writing behaviour when confronted with processes of other peers in the observation conditions and other students did not, should be a next step in relating effects of interventions to individual differences.

Psychology and writing as learning activity

There is a strong movement, certainly in the Anglophone world, holding that writing contributes to learning. It started in the 1960s in London, with the work of James Britton and colleagues, who advocated that in the act of spontaneous, expressive writing, tacit knowledge was generated and therefore being known by the (young) writer. This insight influenced a number of scholars in the USA and Europe (Tynjälä, Mason, & Lonka, 2001). The movement is called Writing across the Curriculum (WAC), but is also known as WID (Writing in the Disciplines), CAC (Communication across the Curriculum) or CWAC (Creative Writing across the Curriculum).[1] At first sight, it may be a little weird to expect that writing could serve as a learning activity, as writing is an effortful process, as is learning to write. So why use the act of writing or the act of text production as a learning activity?

Theoretical support for learning to write

The psychological theoretical support for the claim that one learns when writing, and under what conditions one may learn from writing, is scarce. The most recent deep analysis of the often-implicit assumptions in writing-to-learn studies was delivered by Klein (1999). His question was not if writing contributes to learning, but 'when writing contributes to learning, how does it do so?' (p. 206). He collected claims from several studies, and classified them into four broad hypotheses, which we relate to the components of the Hayes-and-Flower writing process model.

Spontaneous text production (shaping at the point of utterance)

This hypothesis claims that the basic process of encoding thought in language leads to a better understanding of material. This hypothesis relies on the translating or formulating component of the Hayes-and-Flower model – that the learning is in formulating the knowledge. The learning is in the discovery when writing freely, expressive, not transactional. The cognitive load is minimal: the most important thing is keeping writing. There is some evidence that writers indeed generate most new ideas in the phase of initial drafting, and that the most original ideas appear in the pre-writing phase, and not in writing the final text. However, further evidence for this hypothesis is

[1] *See the WAC Clearinghouse site (http://wac.colostate.edu)*

restricted to anecdotes. One of Klein's points of critique on this hypothesis is that exploring the writer's experience and knowledge by writing can indeed generate ideas and concepts and experiences, but cannot lead to the revision of student's existing conceptions (Klein, 1999, p. 219).

Forward search

This hypothesis states that the learning is in the reviewing component of the Hayes-and-Flower writing process model. The crucial ingredient is that the learner selects and organizes ideas in a previously written text, which is written explicitly to discover or generate ideas. When reviewing, the writer-learner elaborates a detailed representation of the communicative context and of the writer's goals in that context. To satisfy these goals, writers must evaluate and modify the existing content. This is the process through which writers recursively review the initial drafts of their texts to transform their ideas iteratively (Klein, 1999, p. 221). Text preserves the ideas, and allows learners to reread them and to develop them further. Galbraith (1996, p. 121) stated that discovery is a consequence of the writer's implicit disposition towards a topic and the text emerging in the course of the spontaneously articulating thought. A disposition is semantically complex, and the expression of this semantic network is necessarily constrained by the limited amount of information that can be expressed in a sentence. A sentence can only partially express the disposition. Therefore, writing is dialectic between the text written so far and the writers' disposition. Only when the disposition is coherent will the text be coherent. Otherwise, other drafts must follow. For this hypothesis, the evidence is weak. From expert-novice studies, we know that experts review initial drafts more deeply, but this does not imply that they learn more.

Backward search

This hypothesis claims that the learning is a result of the goal-directed planning component of the Hayes-and-Flower writing process model. As in the forward search, the representation of the communicative context is guiding the generating and organizing processes of content. In contrast to the forward search hypothesis, the object of the process is not text, but thought. The writer's rhetorical goals inform the selection of content goals, which, in turn, inform the selection of operations to transform content. This may lead to changing other content in the text, or to changing the rhetorical goal. Studies show that different goals lead to different texts, but until now, no effects on learning or knowledge transformation have been tested.

Genre

Klein's fourth hypothesis does not pertain to a component of the writing process, but to genre, the text genre knowledge component in long-term memory in the Hayes-and-Flower model. According to the *genre hypothesis*, the operations and forms of organization required by different genres lead to equivalent operations upon content. As a result, knowledge is organized and ideas are linked together. The specific operations and forms of organization required may vary across disciplines and across different activities within disciplines.

In a recent meta-analysis on writing to learn, Bangert-Drowns, Hurley, and Wilkinson (2004) report a summary of effects of 46 studies. The average effect size proved to be small (median: .20; range from − .077 to 1.48). Treatment effects were correlated with treatment length ($r = .33$). Time per writing assignment ranged from 3 to 55 minutes; longer assignments were related to less positive effects ($r = . - 70$). This might be

caused by lower motivation, because writing is tough, especially for weaker writers, and/or by less time on spent on coverage of course content. The number of assignments was not related to effect size. Whether the treatment contained personal writing or not, did not affect the effect size, nor did the presence or absence of feedback. The contribution of meta-cognitive prompts was significant: when treatments included prompts requiring students to evaluate their current understandings, confusions, and feelings in relation to the subject matter, the effect size was significant larger, but still small (.09 vs. .26). Unfortunately, the four Klein hypotheses were not applied in the coding of studies in this meta-analysis.

Individual differences in writing to learn

It is remarkable that in the writing-to-learn paradigm, no attention is paid to individual differences. We know from studies on writing processes and from Galbraith's studies of different types of writers, that individual differences do count. It seems unreasonable to expect that one of the approaches put forward by Klein would work for all types of writers. While low self-monitors and revisers might gain by writing ('shaping at the point of utterance') and forward search (drafting, revision, redrafting), high-self monitors and planners might gain by backward search processes. Kieft, Rijlaarsdam, and Van den Bergh (in press) studied the effect of writing styles on learning gains in writing about literature, and found an interaction between writing style and interventions – one focusing on planning, the other focusing on revision. Learners (16- year-olds) with a high tendency towards revising writing style writing are better off with an intervention that focuses on planning when implementing writing as a learning tool in a literature curriculum. For students with low tendency on revising writing style, it does not matter whether they followed an intervention aiming at planning or at revision. The degree to which students tend to a planning writing style does not interact with the interventions: all levels of planning style benefit most from the planning intervention.

Conclusions

Let us conclude by listing some of the points we have raised in this paper.

(1) *Writing* is indeed a complex activity with a limited number of freely interacting components. Various cognitive activities fulfil different functions, dependent on the context in which they operate. When we study the *writing process*, we must elaborate on writer variables, task variables, as well as on processes. At present, a small but active research community is involved in the study of writing, representing all kinds of disciplines varying from linguists to educationalists to cognitive, developmental and social psychologists. We hope that more psychologists will enter the field, and that the complex compensatory relations between the components that constitute writing will be further explored. We are still in the phase where we are learning to ask better questions.

(2) *Learning to write* is an even more complex phenomenon, which has rarely been studied on line. What is studied is how task variables (see section on referential communication) influence the quality of the text quality (output). However, we still know almost nothing about what kind of cognitive and social components are involved in learning to write. Learning-to-write theories are an open field. The social-cognitive approach Schunk and Zimmerman promote has strong potential, although insight into on-line socio-cognitive activities in learners is lacking.

(3) *Writing as a learning activity* is strongly advocated in some communities, but theoretical underpinning and empirical support are weak. Psychology as a discipline could contribute to this field. Process studies in how students learn while writing are lacking. Insight in conditions in which the act of writing or subsequent cognitive activities involved in writing (planning, formulating, and reviewing) can contribute to learning limitations.

(4) *Teaching writing* is an ongoing practice, eclectically informed by various disciplines, and various domains of research, and various types of studies. However, the practice of teaching is moving slowly towards modern insights, and in general, one-dimensional textbooks mostly advocate one way to learn to write – the deductive route via theory and application. The meta-analysis of intervention studies Hillocks (1986) reported clearly demonstrated that this presentational model of teaching did worse than the interactional method of teaching. The meta-analysis also revealed some other criteria for success: learning-teaching sequences focusing on awareness building of what a good text entails, and distinctive features of the content to write about (criteria of good text and structured content knowledge) via an inquiry model (inductive, constructive, co-operative, interactional) seem to work. These criteria fit the points we raised in this paper, although 'observation' as a learning activity is not mentioned in Hillocks' study. Successors of Hillocks' study should try to focus on what students do or should do in interventions (learning activities), or sequences of learning activities, taking into account the interaction between the effect of these activities and the task situation and individual level of writing skill and writing style preferences. What may work for most students may be implemented too early or too late for others, or may not work at all.

(5) *Observation* is an important activity in all kinds of expertise acquisition: experiencing how readers process a text written with a certain purpose, experiencing how different writers solve writing problems differently, with different success, and how different learners acquire subskills, with different success – these are three situations that contribute to a larger awareness in learners/writers in the goal-directed nature of writing and learning, the strategic approach of writers and learners, the large variety of communicative and learning strategies and the variability of the success of these strategies. Success of these strategies depends on the aim, the individual and the task situation. The learner must learn to find the best fit between task, individual and result by managing a potentially interactive system of cognitive activities. Therefore, the learner must have many varying opportunities to practise intentionally.

(6) *The complexity of the writing process* is often transposed to classrooms: writing is difficult. However, for many children, writing is fun; a meaningful and rewarding activity. The complex figures we reported here on writing processes should not be misused as making teaching writing almost impossible. On the contrary, the differences in writing (and probably learning) processes and preferences form a rich resource for teaching and learning. Observing, comparing and communicating these differences support the formation of strategic knowledge. Figure 10, which reflects the assumptions in Sonnenschein and Whitehurst' studies, could also be applied in a somewhat adapted form as a curriculum format. In writing lessons, complete communicative situations should be implemented, where writers/speakers and readers/listeners can meet each other and can experience how goal-directed communication works. At the same time, observation and evaluation tasks could be implemented, aiming at observing the producer and/or processor of communication (see Fig. 15).

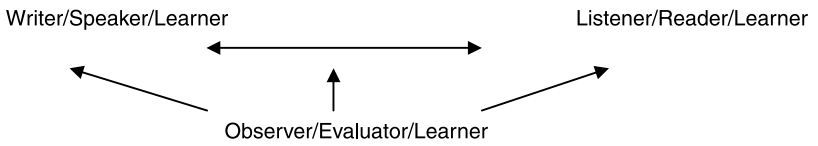


Figure 15. Learning to communicate: completing communicative roles in classrooms.

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Most chapters from the *Studies in Writing* book series can be accessed free on-line via the homepage of the Special Interest Group on Writing of the European Association of Research on Learning and Instruction (SIG WRITING EARLI) from http://sig-writing.org or directly http://ds015.xs4all.nl/sig-writing/start. The database contains two repositories: one with prepublications, published articles, chapters and conference papers (WRITING on-line archive) and an on-line refereed research journal on writing.

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