Handbook of Communication Competence

Edited by
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14. Training of writing and reading

Eva-Maria Jakobs and Daniel Perrin

Even if all of the users of this handbook skip over this chapter, the text would nevertheless still have been appreciated by some readers: at the least it has been carefully read by those who wrote it and revised it. Writing and reading processes intermesh during writing and editing: authors read source texts, their own developing texts, and the comments and revision suggestions from their co-authors. Being able to write, therefore, always means being able to read. Poor readers find it difficult to monitor text quality and identify weaknesses. Difficulties are intensified when facts have to be researched and source texts have to be understood and processed. Reading, thus, is part of all writing processes, and in source-based text production reading is twice as important. Because of this, it is surprising that so little attention has been paid to reading in the teaching of writing. Education and training tend to focus either on writing or reading competence; programs that systematically relate writing and reading as a complex combination of skills are rare.

The present chapter deals with this type of training. It defines and links the basic terms “writing”, “reading”, and “training” (section 1), locates reading and writing processes in text production (section 2), provides a detailed review of methodology (section 3) and the state of research into the interface of writing, reading, and training (section 4), and finally identifies gaps in the current research (section 5). The chapter focuses on the reading and writing processes of adults involved in text production, mostly professionally, in domains such as science, technology, administration, and public communication. As examples of a case study, details of a training and consulting project in a journalistic editorial office are provided throughout the chapter.

1. Basic concepts: Writing, reading, and training

Writing refers to the activity of language users encoding thoughts in permanent form; that is, as visible signs on some kind of material or storage device with suitable tools and according to set rules. This occurs in processes. The writing process is a predominantly purposeful, mental, and material procedure to produce a written text. Both individual and communication objectives can be pursued. For example, epistemic writing relieves thought processes; transcribed thoughts can be examined and organized, such as by brainstorming with mind maps. Mnemonic writing uses transcriptions as aids for remembering, such as
the classic shopping list. Finally, a text is also accessible to other people, in
other places, and at other times. Writing detaches thoughts from the author and
the production situation and allows communication over time and space, with
known and unknown readers (Ludwig 2005: 11–21).

Reading refers to the activity of language users understanding written signs.
They interpret these signs according to rules and establish an idea of what a text
could mean, guided by both the signs and their own world knowledge. Reading
also takes place in processes, predominantly purposeful processes that create
mental representations from physical representations. In written communi-
cation, reading is the counterpart of writing: people perceive an offer of com-
munication by reading a text. Reading can occur in isolation from writing, but
communicative reading processes often include minor writing processes, such
as when people make notes about a text they are reading. Conversely, every
writing process includes reading processes, since people always read parts of
what they have just written. For this reason, it makes sense to address reading
whenever text production is being trained (Freiman 2005).

Training in the everyday sense of the word can refer to practice, instruction,
educational courses, or various kinds of professional or personal development,
in brief, to measures that maintain and improve certain abilities and skills. The
scientific definition of the term refers primarily to didactic methods and applied
psychology. Under this definition, trainings are understood to be teaching and
learning events in which a trainer professionally and methodically guides trai-
nees within the conflicting poles of the individuals themselves, their roles, and
the setting by: clarifying their starting position; setting goals; acquiring the
means to reach their goals; and expanding their repertoires of competences
(Lippmann 2006: 28–30). Training thus extends the individually-determined,
socially-influenced, and socially-influential competences or cognitive capaci-
ties in order to allow specific problems within the framework of specific expec-
tations to be solved in an appropriate and effective way. In text production
training, the focus is on writing tasks – and interlinked processes of writing and
reading.

2. Reading processes within writing processes

Studies on text production show that reading processes more or less systemati-
cally accompany the entire process of text development. The type and purpose
of reading vary, contingent on the stage of text development and on the related
text (Jakobs 1997). Depending on the related text, two types of reading pro-
cesses can be differentiated: production-oriented reading, to monitor the de-
veloping text product (section 2.1), and source-oriented reading, to understand
texts being referred to that are written by other authors (section 2.2).
2.1. Production-oriented reading while writing

Reading processes are not explicitly mentioned in early models of text production (such as those of Hayes and Flower 1980; Bereiter 1980; and De Beau-grande 1984) and at most are just implied when models refer to writers resorting to knowledge that is either present before writing begins or that emerges during the writing process and can be modified.

Other approaches, especially more recent ones, emphasize the value and diverse functions of reading in text production and the close interconnectedness of writing and reading processes (e.g. Bracewell and Frederiksen 1982; Ludwig 1983; Nelson Spivey 1990; Flower et al. 1990; Rau 1994; Jakobs 1999). In general, such approaches view reading as an important part of the ongoing monitoring of what has already been written and as a basis for additional decisions about production (Jakobs and Molitor-Lübbert 1994; Hayes 1996). This occurs at all levels, including graphomotoric functioning, formulation, intermediate products, and text versions.

- **Graphomotoric level**: writers follow the appearance of characters on the recording surface and, in a scarcely conscious monitoring process of visual feedback loops, check the graphomotoric realization of linguistic expressions. People see what they write, just as they listen while they speak, and can immediately detect and rectify motor errors and slips.

- **Formulation level**: writers read formulated chunks of texts and check them for grammatical, semantic, and logical coherence. In periods of difficulty formulating passages, re-reading can encourage new ideas on how to continue (reactivation re-reading; cf. Rau 1994) and help assess before writing them down whether draft formulations would fit with what has already been written (evaluative re-reading; cf. Rau 1994). Finally, re-reading aloud produces a sound pattern that provides important indications about linguistic violations (Keseling 1988: 233).

- **Intermediate product level**: writers read what they have already written in order to heighten their awareness of it before continuing (reading to comprehend vs. reading to evaluate; Hayes et al. 1987) and then to correct discrepancies between the current and intended form (Molitor-Lübbert 1984) and/or to encourage ideas for the next stages of work (Keseling 1988). Re-reading intermediate products is especially important for bottom-up oriented writers – those writers who start writing with only vague ideas of the text purpose, content, and structure and then use the text production process to clarify them (Molitor 1987: 404).

- **Text version level**: writers re-read the current version of the text they have just written in order to gain a new overall idea of the sense, meaning, and structure of it before they revise the text as a whole. This function of re-reading is important, for example, when an author wants to understand written comments from a co-author and incorporate them into the text.
Re-reading one's own text version before a general revision in order to understand it intellectually and to be able to incorporate comments from a co-author is a borderline case of production-oriented reading. The writing process is abandoned, the text is approached from a new angle, and preparations are made for a new type of creative process. This holds even more for cases when an author optimizes the existing text of another author (Schriver 1989) or when people rewrite their own texts for a different target readership (Sauer 1997). Such variations from production-oriented reading are closely related to source-oriented reading, discussed below.

2.2. Source-oriented reading while writing

Texts often develop intertextually, related to and supported by source texts (Selzer 1993, Jakobs 1999). So-called source reading encompasses all reading processes that are focused on such source texts. For quite a while, research neglected this aspect of reading in writing. Many experimental designs purposely excluded production circumstances in which writers could or had to resort to other texts. In the 1990s, the situation changed: Hayes (1996) included source reading in his cognitively- and socially-anchored model of text production. In his and similar models, source reading aims at and realizes mental representations of the contents of the text, a sense of the author, and the text as a physical entity.

Before and along with general models, there have been specific approaches to and models of source reading, including that of Nelson Spivey (1990) on cognitive-constructive processes in source reading; Ludwig (1983) on source reading from a pedagogical standpoint; Rouet et al. (1996) and Jakobs (1995, 2003) on source reading in scientific text production; Perrin (2001) and Sleurs, Jacobs, and Van Waes (2003) on source reading in journalism and public relations; and Kretzenbacher (1990), Endres-Niggemeyer and Schott (1992) and Keseling (1993) on source reading in summarizing texts. Keseling, for example, shows that the ability of writers to differentiate between important and unimportant source comments, relate texts to each other appropriately, and ultimately apply the information from source texts productively to a writing task depends mainly on their age, writing experience, and reading ability.

Exactly how source reading is embedded in the writing process depends on the task that a writer has to accomplish (Jakobs 1999). The task-dependent factors in writing and reading processes include:

- where source reading takes place in the writing process; for example: before, during, or after formulating content;
- how source reading combines with other activities in text production; for example with copying and citing;
- which source texts are included in source reading and what content is focused on;
- what level of depth and critical distance is employed; for example, whether the reading is tied to evaluation or to elaboration.

In addition, the purpose and profile of source reading depend on the phases that a text production process goes through (Jakobs 1999):

- In the initial stages of text production, writers explore the area: they read up on the topic and gain an overview of the field. Depending on their prior knowledge, the reading process can be rather unfocused and general. A typical strategy of exploratory reading is scanning. The reading attitude is rather neutral, with the reader open to arguments and various standpoints.
- In the course of treating a topic, reading becomes more focused, selective, and restrictive. Source reading, treatment of the topic, and preliminary attempts at formulation influence each other reciprocally. As a text takes form, the perspective on the topic can change, which demands a focused and thorough re-reading of the source texts. Comparing positions requires reading at the highest level of critical-constructive understanding.
- Integrative actions such as citing and reviewing sources frequently necessitate renewed source reading. The linguistic reproduction of content requires discerning re-reading. Quoting directly requires form-oriented reading as well, with the goal of generating as exact a representation of the linguistic surface of the source text passage as possible, even including details such as typing mistakes in the source.

Just as general text production tasks and processes have a determining influence on source reading, source reading has an effect on the whole text production process, the text product, and ultimately on the text production setting. The process of embedding information from a source in a text, the care, the finesse, the reflection – in short, the quality of the source reading influences how previous discourse is used in text production. It can be critical, by questioning and evaluating various positions, or creative, by conceiving and recognizing new connections, or reproductive, by marked and unmarked copying, or manipulative, by distorting the sense of a message. This reproduction in a new contribution to the discourse on a topic ultimately changes the social environment and the conditions for future text production intentions.

To illustrate the interrelationships between reading, writing, and training, an in-depth examination of text production trainings in journalism is made here and at the end of the following sections. In this domain of journalism, text production with source reading is an essential element of professional life – journalistic text production is systematically determined as collaborative re-production in intertextual chains (Figure 1). Under economic conditions, media
professionals with various responsibilities work in teams to create media items from texts and other excerpts of reality they are aware of. Their texts quickly become source texts for the next processing level in the production chain (the dashed line in Figure 1). The media professionals also communicate directly with sources and audiences, and sources, such as interviewed politicians, can themselves be part of the audience for a media item (the dotted lines in Figure 1).

In such a network of cross-references, the social setting – or more precisely, the mental representation of it in the minds of the text producers – determines how any particular previous contribution to the discourse from a source is incorporated into a new text. Conversely, the new text product can have an effect on the social setting, such as when a politician thinks that his comments have been distorted in a newspaper article and as a result refuses to give journalists from that paper any more interviews. This example, selected from one of the many domains of professional text production, demonstrates that text production competence includes the ability to read purposefully: not just the source texts but also the new text being written. This insight has consequences for the methodology of empirically-based text production trainings, discussed in the next section.

3. Methods

Scientifically-based trainings require systematic knowledge at two levels: knowledge about conveying information and knowledge about the topic, in this case, about text production. At the level of conveying information, trainers have to carry out and guide educational processes that are suitable to expand their trai-
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Training of writing and reading 365 nees' repertoires of competences in a targeted way. At the level of subject matter, trainers have to provide theoretically and empirically sound knowledge. If they do not want to put their trainees at the mercy of unquestioned opinions, then they have to know the basic patterns of text production, be able to recognize individual patterns of behavior, discover successful variants, identify deviations from the ideal in their trainees' text production behavior, and decide on appropriate intervention measures with which their trainees can purposefully expand their repertoires of strategies (Fiehler 2002; Johnston 2003). Two groups of methods are applicable in this context: methods of knowledge transfer (section 3.1) and methods of knowledge creation (section 3.2).

3.1. Methods of knowledge transfer

Whereas in school children learn reading and writing as new skills, professional text production trainings are oriented to adults with previously established competence in written communication (Fiehler and Schmitt 2004: 132). The educational experience of training is essentially oriented to retraining or "learning anew", and not to new learning. Trainees, guided by their trainers, have to learn to recognize and evaluate established routines, develop new routines, and thereby break open, expand, and increase the flexibility of their repertoires. Put succinctly, they have to de-automate and re-automate their patterns of solving problems. In contrast to new learning, such retraining is only possible through conscious monitoring, analysis, and practice (Becker-Mrotzek and Brünner 2004; Lambertini and Ten Thije 2004): by practicing examples in simulated situations in training sessions and repeating them in actual situations outside of the training context (Fiehler 2002: 33–34). This framework determines the (a) objectives and (b) forms of teaching and learning in text production trainings.

(a) With their intentional, consciously triggered teaching and learning processes, both teachers and learners pursue goals: they strive to elaborate competences. The learners should understand and convince themselves that a certain type of behavior is sensible for certain purposes, since they are supposed to implement, retain, and maintain that solution pattern (Becker-Mrotzek and Brünner 2004); the learners should work on constantly developing certain abilities. With these competences, they can subsequently solve problems of varying degrees of complexity. To do so, the corresponding resources have to be made available (Perrin, Dörig and Vervoort 2005: 43).

- These competences represent abilities people have to cope with certain demands and solve problems in dealing with matters of fact, with other people, and with themselves (Euler and Reemtsma-Theis 1999). Subject compe-
tence, the competence to deal with world matters or things, consists in connection with text production trainings of recognizing functions and forms of texts and text production processes and of being able to produce suitable text products with suitable processes in specific situations (Antos 1995; Schoonen and De Glopper 1996; Steinhoff 2003; Hyland 2003). Social competence, oriented to other people, allows people to assess other participants (and an audience) in a communication situation and to produce a communication offer in an addressee-appropriate way (Hyland 2001; Schriver 1992). Finally, with self-competence people can focus their emotions (Brand and Powell 1986; McLeod 1987; Brand 1989; Hayes 1996; Herrmann, 2006) and especially their motivation (Charney, Newman, and Palmquist 1995; Bruning and Horn 2000; Pajares 2003; Hidi and Boscolo 2006) on a text production task.

- The problems that have to be overcome in practice and in the preparatory learning situation can have various degrees of complexity (Dörig 2003: 548–574). An example of a normally simple problem is the power supply for a portable computer on commuter trips: one of the bits of experience that those who read and write on their jobs have is that computers need power, batteries discharge, and electrical outlets are often lacking. To solve this problem, it suffices to take along an additional charged battery as a replacement or to keep the energy requirements of the computer low, for example by dimming the screen (although that makes reading more difficult). Examples of complex problems, by contrast, include overcoming writing blocks (Rose 1984; Keseling 2004) or balancing the conflicting demands of sources, clients, co-authors, and addressees in text production. In much research into text production, experts have been found to differ from novices in that the former can solve such complex problems in a routine way (Rouet et al. 1996; Sharples 1996; Torrance 1996; Beaufort 2000, 2005; Perrin 2001).

- To overcome complex problems, three resources are required to various degrees: knowledge, methods, and attitudes (Dörig 1994). Learning targets for knowledge focus on the information about a subject, for example knowledge about usual sources and text genres (Schoonen and De Glopper 1996; Hyland 2003). Learning targets for methods focus on the implementation of what has been learned with suitable abilities and skills, the writing skills (Jeffery and Underwood 1996; Tapper 2000; Uppstad and Wagner 2006). Finally, learning targets for attitudes focus on things like sensitivity to communication cultures (Surma 2000), interest in sources and addressees, readiness to listen in research discussions, and the care in attributing borrowed utterances and formulations to sources; put simply, on the level of attentiveness for communicative processes (Fiehler 2002: 34).
(b) Teaching and learning are directed to increasing certain types of subject, social, and self-competence on the basis of knowledge, methods, and attitudes. The choice of educational arrangement thus depends on the learning targets. This arrangement, be it a consultation, coaching, or training session, is basically determined by the form of teaching and learning in terms of control, social context, and type of interaction (Perrin, Dörig and Vervoort 2005: 45).

- The control form describes who regulates the teaching and learning process more: the teacher or the learner. Processes that are strictly controlled by the teacher are managed collectively: the teacher determines the processes for an entire group. Such training sessions can convey information such as which features are of central importance for a certain text genre, which strategies and techniques experienced and inexperienced professional colleagues use (Fiehler 2002: 32; Rijlaarsdam et al. 2005: 127), or how quality of text production can be ensured in an organization. However, the abilities to produce texts of a certain genre, to avoid writing blocks, or to engage in constructive, institutionalized criticism of texts all require individual practice and the establishment of a professional attitude to production. These abilities result from learning alongside learners’ individual insights and experience, questions and initiatives, self-assessments and assessments from others (Hansen 2003; Fiehler and Schmitt 2004: 132; Lalouschek 2004).

- The social form describes whether people learn on their own or in groups. Those who learn individually, for example, by systematically reflecting on their own writing practices (Bräuer 2000; Varner and Peck 2003), have the greatest possible degree of independence in shaping processes. Learning in groups, by contrast, allows social competence to develop the ability to learn, work, and act with others. For instance, the abilities to constructively criticize texts and conversely to respond appropriately to criticism can only develop if people in an learning situation have the opportunity to give other people feedback and respond to other people’s comments. Dealing with others while learning in groups also promotes dealing with the subject matter itself: the educational material is clarified by people questioning and explaining it (Bliesener 2004: 177).

- The interaction form describes whether a group communicates directly with each other or whether communication is technically transmitted over time and space. Being physically present in a learning situation, such as in a training group, fosters direct social interaction but demands that teachers and learners come together at one location at the same time. Distance learning, by contrast, does not require that people physically move except to access some kind of learning platform, such as a book and desk or a computer with an internet connection. Distance learning also allows social interaction. In synchronous distance learning, learners communicate at the same time over
the phone, via videoconferences, or with chat programs. In asynchronous distance learning there is a time delay but learners can choose when they want to communicate by email, in internet forums, and on websites. Internet-based training of writing relies on distance learning (Tench 2006).

Educational arrangements like trainings are therefore determined by both the targets and the appropriate form of teaching and learning. For example, subject competence is in the forefront of text production trainings: trainers impart expertise and trainees work in groups (Bünting, Bitterlich, and Pospiech 1996; Trappen 2002; Lalouschek 2004; Klemm 2004; Segev-Miller 2004). With text production coaching, participants often work individually with their coaches and focus more on targets concerning self- and social competence (Wolf and Thomason 1986; Zaslow 1991; Begovich 1993; Baldwin and Chandler 2002; Hansen 2003). Another type of training, supervision and organizational development, is oriented to whole communities (Dysthe 2002; Mönnich 2004). Writing therapy is committed to objectives beyond communication success (Salovey and Haar 1990; Greenhalgh 1999; Pizarro 2004). A complex arrangement, which often includes both trainings and coaching, is text consulting (Ortner 2004; Klemm 2004; Perrin 2006b).

An example of a complex teaching and learning arrangement is a newsroom consulting project with integrated text production coaching and trainings (Perrin 2006b). The project was carried out from 1999–2001, both as a service contract and as an ethnographic case study, and involved 180 writers and editors of the print edition and 14 of the on-line edition of the highest-circulation Swiss quality newspaper (Tages-Anzeiger). The client’s objectives were to increase the quality of the newspaper and to improve its image. It was agreed to cooperate at four levels of organizational text production in order to: a) establish a basic mutual appreciation of the commission; b) develop a mission statement and guidelines as a measure of the quality to be strived for; c) measure the repertoires of text production strategies in the newsroom against the guidelines and expand them as needed; and d) cyclically review the whole procedure by checking the end product, the printed newspaper. This plan called for methods of knowledge transfer, especially at the level of c). On the other hand, it presupposed knowledge about text production in general and about text production in the specific situation at hand. What was also needed therefore were methods to create this knowledge.

3.2. Methods of knowledge creation

Text production trainings as professional development for people who write as part of their jobs are oriented to trainees who already have so much competence in reading and writing that they have been managing fine professionally until now. If trainers want to claim to be experts in text production – and not only ex-
experts in guiding learning processes—then they have to be able to offer and create knowledge about text production that extends beyond the trainees’ practical knowledge and professional experience and is also verifiable (Olson 1987; Fiehler and Schmitt 2004: 132). What is required is systematically created knowledge as well as suitable methods to create such knowledge: not only methods from text production research that examine the finished product, but also those that record the production process in as many of its dimensions as possible, and from several perspectives.

Completely product-based methods include all types of text analysis procedures. Special variants are analyses of typos or slips of the typewriter key (Berg 2002) and of handwriting features (Baumann 2004). If several versions of a developing text are examined, more can be inferred in investigations about the production process than if only the final product is considered (Becker-Mrotzek 1992; Grésillon 1995; Van der Geest 1996b). The big advantage of product-based methods is that data collection does not disturb the production process or change the conditions under investigation. Because of the intrusiveness of most data collection methods, the natural production of text done by hand or with typewriters has hardly ever been registered.

By contrast, when texts are produced in electronic work settings it is also possible to trace the process of text production without any perceptible change in the writing situation: every keystroke can be recorded and the development of the text can be reconstructed step-by-step (Severinson-Eklundh 1994; Bergmann and Meier 2000; Severinson-Eklundh and Kollberg 2003; Strömqvist et al. 2006). After every text production process, authors can report in verbal protocols what they were doing and thinking. This can also be done during writing, but then the research procedure has a strong influence on the text production situation (Pitts 1982; Smagorinsky 1994, 2001; Levy, Marek, and Lea 1996; Janssen, Van Waes, and Van den Bergh 1996). Finally, it is possible to investigate discussions between writers who are producing a text together (Levin and Wagner 2006). Multi-method approaches consider the object of study from several of these perspectives and thus provide more dimensions to reconstruct text production than single-method approaches do (Beaufort 1999; Sleurs et al. 2003; Dor 2003; Perrin 2006c).

One such multi-method approach, progression analysis, was used in the Tages-Anzeiger consulting project introduced in section 3.1 (Perrin 2006b). With the agreement of the staff members, a computer program recorded all of the work done at all of the workstations in the newsroom. Writing processes recorded in such a way can be presented systematically and evaluated or even played back as a film. One possible way to represent these is with a so-called progression graph. It shows how a writer moves through the developing text with the computer cursor. The writing steps over time are shown on the horizontal axis, and the spatial sequences in the text product are indicated by the verti-
cal axis. A line from the upper left to the lower right represents a writing process without any backward jumps in the text; a jump upwards or downwards in the graph indicates that the writer jumped backwards or forwards (by scrolling up or down the screen) to make a change in the previously written text. For example, the progression graph of a short title that an editor wrote in eleven attempts shows a lot of movement (see Figure 2).

![Progression Graph]

Figure 2. A progression graph indicates the sequence of revisions in a writing process (Perrin 2001: 33).

In the consulting project, the editors and writers were able to review their writing processes in the form of progression graphs or videos in real-time or time-lapse mode. They viewed these with the consultant, watching how the text developed on the computer screen and commenting continuously on what they had done while writing and why they had done it. Recordings were made of these event-supported retrospective verbal protocols. Of course, a retrospective verbal protocol cannot be interpreted as a faithful reproduction of the considerations that a writer actually made during the writing process. Rather, stimulated by observing their own writing behavior, writers mention some of the considerations they could have made while writing in comparable situations: considerations based on their accessible knowledge about language, about language use, and in particular about text production. In the excerpt below from a verbal protocol, the editor explains how he formulated a title so that it was exactly the right length and "immediately" indicated the relevance of a text.

"It is too long, so I go and just take out 'crash'. Then I take out another word, because it's still too long. There isn't much room on this page." – "Now I just have the title 'Insulation examined'. But something else has to be added, so it's immediately clear what it's about." (translation from the German protocol)

Such considerations and text production movements can be related to the text product, the amount of work involved, the writers' expectations of themselves,
Training of writing and reading

and the expected quality specified by the newspaper in its guidelines. This editor, like others, failed to allocate time carefully enough and so often came under pressure towards the end of the production process — and of the text. This diagnosis lent itself to an intervention with training techniques for text planning. Individual coaching was called for when successful and experienced journalists wanted to break out of production routines that had proven reliable but become too boring for them. With team coaching and organizational development sessions, groups improved the production processes that were based on division of labor, such as updating previously uploaded on-line news reports. Diagnosed problems thus determine the teaching and learning arrangements and the topics or, in the case of trainings, the training fields.

4. Training fields — research questions and findings

Text production training is directed to certain text production tasks that presuppose certain competences in written communication. Systematic knowledge about written communication has been elaborated in the field of linguistics. A perspective on the information about text production training can therefore follow from the linguistic-pragmatic insight that language structures are trained through use and depend on the language functions in the settings where the language is used. Text production tasks and trainings can be differentiated according to their relationship to the text production setting (section 4.1), function (section 4.2), and structure (section 4.3).

4.1. Training and text production settings

Text production is embedded in more comprehensive verbal and non-verbal settings: in situations, social events, and projects. These settings influence text genres and their re-production, and thus the reading and writing of them. This is apparent in diachronic analyses such as in the history of writing. For certain types of recurring text production situations in domains such as universities, business, or journalism, patterns of text production have developed along with corresponding educational activities. Some examples of research into this area are: Ludwig (2005) on the history of writing and the interface of writing with reading, speaking, and listening; Russell (2002) on the history of writing at universities; Chin (1994) on the notion of context in writing research; Gunnarsson (1997) on writing processes from a socio-linguistic standpoint; Landis (2003) on writing and reading as social and cultural practices; Björk et al. (2002) and Kruse (2006) on teaching academic writing at universities; and Ruhmann and Perrin (2002) on the similarities and differences between scientific and journalistic writing as a starting point for writing training sessions.
The most important setting for written text production for most adults is the workplace. Text production there is a component of other activities, the text producers are integrated in a community that is based on the division of labor, and texts are closely related to other texts in an on-going discourse. Examples of research include: Spilka (1993), Van der Geest (1996a), and Jakobs (2005a) who provide an overview of writing in the workplace; Schneider (2002), who describes writing in the workplace as an activity that is influenced by the organization but is also reactive and influences the organization; Selzer (1993), who discusses the intertextuality of writing processes in the workplace; O’Hara et al. (2002), who consider writing in everyday life as an evaluation of multiple sources; and Melenhorst, Van der Geest et al. (2005), who offer observations about how professionals take notes. As well, Henry (2000) identifies cultures at writing workplaces; Flower and Ackerman (1994) present strategies for professional writing; Gunnarsson (1997) explains the interplay of written and oral communication in the workplace; Henry (1995) talks about ghostwriting in the military; Pogner (2003) analyzes writing produced in cooperative work between engineers; and Zhu (2005) focuses on social writing in various cultures. Jakobs (2005b) describes domain and context related problems of writing at work.

In cultures with institutionalized schools, people learn about writing before they arrive at the workplace. A second, task-specific writing socialization process takes place in professional life and in the workplace. High school and university graduates either have to acquire product and process patterns on their own or they are taught them, which often happens in trainings. Schools and universities can also prepare their students for the move to the writing setting of the workplace. Some relevant research includes: Dysthe (2002) on professors as imparters of academic text culture; Surma (2000) on professional writing as the object of research and university education; Tapper (2000) on the preparation of university graduates in communication as an employee; Beaufort (2000) on writing socialization in the conflicts between objectives and roles in a non-profit organization; Parks (2001) on retraining as a part of the writing socialization for nurses who change language communities after they finish their medical training; Becker-Mrotzek (2004) on the acquisition of writing skills using the example of operating instructions; and Ongstad (2005) on writing socialization in institutions, as well as Jakobs and Schindler (2006) on writing socialization in the field of engineering.

In the modern world, writing workplaces are computer workplaces. The plasma consistency of texts on a computer screen makes it possible to constantly revise them, and the network infrastructure simplifies access to stored knowledge and encourages cooperative work in spatially and temporally stretched communication situations. Research has been carried out by Spinnen (1992) on the influence of the writing tool, especially the computer, on writing; Bolter (1991) on the development of writing right up to writing hypertext on the

Whereas text production is simply an important part of supplying services and material goods in many professional fields, it is actually an element of the net product itself in professional fields of communication: professional communicators generate nothing but attempts at communication, such as written texts. Text production trainings at the workplace or in educational institutions represent a key component of guided socialization in these communication fields, which is professionalized late (Perrin 2006b). In any case, there is little distinction made between training and coaching in the professional discourse in the field. Coaching is customarily used to refer to many forms of teaching and learning activities that are part of or accompany professional life. Some examples are given in: Ruffner (1981), an empirical approach to assessing journalistic writing; Wolf and Thomason (1986) and Laakaniemi (1987a, 1987b), on how writing coaches and trainers work in newsrooms; Coulson and Gaziano (1989), on the assessment of writing coaches by journalists; Begovich (1993), on writing coachings in small editorial offices; Chin (1994), on the notion of context in writing research and its application in journalism education; and Perrin (2003), on investigating journalistic writing strategies as a part of the preparation for training and coaching sessions.

In the consulting project with the Tages-Anzeiger editorial staff mentioned in section 3.2, the consultant and the client first established a joint understanding of their collaboration. They agreed that the consultant would accompany the editorial office in organizationally anchoring quality management for text production as a circular process. This involved locating and including the relevant people, defining the desired quality of the text production, measuring the current quality level, optimizing the text production processes – and re-considering the standard of the desired quality with new experience. In addition, a mutual understanding of journalist text production was negotiated. It was understood to be as not only an individual task but also an organizational, institutional, and social task: a division of labor at the interface of cognitive and social practices in which problems were to be solved and decisions to be made constantly at vari-
ous, sometimes conflicting levels. For example, journalists are supposed to reach a broad audience at low cost, in the interests of the media company, while at the same time prepare socially relevant topics in an nuanced way, in the interests of the public. Defusing or resolving such conflicts in expectations with more functional texts and production processes was the objective of the consulting process and its integrated trainings.

4.2. Training and text production function

Independent of the domain and research orientation, certain basic functions have been ascribed to writing: it simplifies thinking, as well as the retention and rendering of information. A writer can capture thoughts in order to examine them in more depth right then, to remember them later, or to make them accessible to others. In every case, writing makes a permanent record of thoughts. Depending on the perspective, thinking can be seen as a supply process for writing, or writing (and reading) can be considered a supportive process for thinking. Relevant research includes: Hermanns (1988) on the "heuristic function" of writing, or "writing as thinking"; Molitor-Lübbert (1996) on writing as a linguistic and mental process; Molitor-Lübbert (2002) on the cognitive basis of writing; Ortner (1995, 2000) for an overview of the relationship between writing and thinking; Ortner (2002) on the conditions that encourage ideas while writing; Ruhmann (2003) on the relationship between thinking, speaking, and writing in process-oriented writing centers at universities; and Smiley (1999) on writers' intentions and insights while reading and revising their own stories.

The connection between writing and thinking is exploited by educational approaches in which writing is done to learn. Ordering things, writing them down, reading them, and reformulating while writing all encourage in-depth consideration of concepts and their associations, of mental representations, and of the material to be learned. Text production helps writers clarify their thoughts and process them, first physically and then mentally. Some examples of research in this area are: Ackerman (1993), with his critical discussion of the "the promise of writing to learn"; Bräuer (1998, 2004), with an overview of writing to learn; Molitor-Lübbert (1998) on the relationship between writing, learning, and media technology; McCarthy Young (1998) on written processing of historical documents as a means of socialization for history students; Varner and Peck (2003) on writing of learning journals in management education; and Klein (1999) on cognitive processes in writing to learn.

In writing to convey information, text producers orient themselves to their intended readers, who will read their records in other locations and at other times. Such texts represent attempts at communication that can work if they correspond to the competences of the addressees. The text producers must therefore learn to read their texts with the eyes of the addressees. In professional text pro-
duction, this relationship to the audience often develops collaboratively. For example, Hyland (2001) discusses audience-appropriate writing of scientific texts; Burrough-Boenisch (1999) reviews strategies used in reading scientific texts in various subject areas and cultures and the consequences of these insights for writing such texts; Gutenberg (2002, 2005) outlines the considerations made by radio editors to write news texts in a way that the newscaster can present them appropriately for the target audiences; Marx (2005) proposes a transcription system for newscasters that marks prosodic features such as accent and intonation; Dor (2003) examines the factors journalists consider in trimming their headlines to their readership; and Sleurs et al. (2003) presents a PR writer's rationale for focusing and inventing quotes to attract audience.

In the Tages-Anzeiger newsroom consulting project described in section 3.2, text producers fulfill various functions to meet the expectations of various parties. These functions can be grouped into those that 1) present a topic, 2) include text protagonists that are interesting to their public, 3) introduce the writer's own position, 4) assign speaking roles and moderate the discussion, 5) establish a relationship with the audience, and 6) observe the economically-determined production constraints of space, time and costs. These functions can contradict each other. For example, writers who stop doing research as soon as they can outline the essentials of a topic save time and can present their knowledge in little space or broadcast time. By contrast, those who isolate and differentiate contradictions do better justice to a complex topic but need more space and time, a conflict between functions 1) and 6). If writers incorporate direct quotes into a text, they might have to present the utterances to the sources for authorization, which risks production delays. Writers who want to avoid this problem by incorporating the utterances as indirect speech forfeit authenticity, a conflict between functions 6) and 4). As explained in more detail in Ruhmann and Perrin (2002), decisions at certain points in the production sequence can neutralize conflicts. Trainings thus can profit from models of text production structure.

4.3. Training and text production structure

Text production proceeds as a process in time. A text production process can be defined as the totality of all of the production steps between the perception of a writing assignment and the submission of the text product to the addressees or the next higher production authority. The individual activities have various degrees of complexity, ranging from finding the global sense to physical control over the writing tool. For effective trainings, it is crucial that text production processes are pattern-governed. Research into such regularities includes: Alamar-got and Chanquoy (2001), with an overview of writing models; Ludwig (2005), with a hierarchical model of writing instruction and learning separated into
writing letters (handwriting lessons), writing words (spelling), writing sentences (stylistics), writing texts, producing documents, and producing written communication; Levy and Ransdell (1996), about “writing signatures”, procedural basic patterns that recur in a particular individual’s writing processes; Van Waes and Schellens (2003), about such basic patterns or “writing profiles” of experienced writers; and Antos (1995), on the function of sample texts and text production patterns in learning to write.

Phase models of the text production process basically assume that different activities predominate during different time periods in the process. Most of the newer models describe the process as incremental, increasing at every level. Both far-reaching decisions such as those concerning topic planning and local actions such as correcting a typing mistake are possible at any time but not equally probable at all times and not equally functional at all times. Furthermore, phases can overlap each other and recur cyclically. For example, Levy and Ransdell (1995) discuss the change in cognitive effort for text planning, creation, and revision during the course of the writing process, and Severinson-Eklundh (1994) describes linear and non-linear sections of writing processes, meaning those with little or much back and forth movement in a developing text.

Three phases of text production are strongly supported in the academic discourse on writing research and education: planning, formulation, and revision. They can be traced to earlier models, such as that of Hayes and Flower (1980). At that time, writing processes were investigated with simple tasks in experimental settings. However text production in situ, for example as an activity in professional life, also includes understanding and determining a sensible task as well as interfaces to evaluate the text product. Relevant research has been carried out by Keseling (1992) on planning in the pauses while writing and speaking; Hayes and Nash (1996) on planning while writing; Van der Geest (1996a) on text planning from the perspective of professional writers; Wrobel (1997) on modelling formulation processes; Wrobel (2002) on “mental pretext”, a cognitively-produced but not yet transcribed idea of a formulation; Baurmann and Ludwig (1985) and Rau (1994) for an overview of revision in the writing process; Sommers (1980) and Flower et al. (1986) on revision strategies used by students; Van den Bergh, Rijlaarsdam, and Breetvelt (1994) on the relationship between the revision process and text quality; Severinson-Eklundh and Kollberg (2001) on revision patterns used by various authors; and Allal, Chanquoy, and Largy (2004) on revision in writing education.

Just as the text production process can be divided into phases, the whole process can be interpreted as one of many stages in a superordinate pattern of text production. Professional abstracting, for example, represents such a process pattern: a previously written text is summarized for later users. Abstracting is a type of text generation which involves a lot of reading and thinking but relatively little actual formulation. Consequently, abstractors have a corre-
spondingly wide repertoire of reading strategies at their disposal. They read to establish a mental representation of the original text, to ascertain suitable passages for the formulation of the abstract, to get ideas for how to start the abstract, or to find a text passage that they cannot quite remember exactly. Endres-Niggemeyer and Schott (1992), for example, discuss reading and writing for abstracting; Melenhorst et al. (2005) make observations about the various practices of professional reviewers in note-taking while reading on-screen; and Galbraith (1996) explores how inexperienced writers produce drafts of texts.

Psychologically-anchored and experimental writing research is heavily focused on individual writers. However, such approaches fall short for knowledge creation and transfer. Professional writing is always based on division of labor, integrated in other processes that are also based on division of labor. In these processes, several authors work on a text at almost the same time or in succession, consciously referring to each other. Examples of research in this area include: Bracewell (2003) on collaborative writing as an activity at the workplace; Bauer and Hammer (1996) on feedback during the production of journal articles and effect of feedback on the texts; Pogner (2003) on the function of collaborative writing when engineers work together; Wolfe (2005) on non-verbal communication during collaborative text planning by a group of students; Berg (2002) on typographical errors that authors and other proofreaders miss and that then appear in journal articles; Bell (1984) on journalistic practices in news editing; and Dor (2003) on collaborative writing of newspaper headlines in a newsroom where the chief editor makes written comments to copy editors about their suggestions and then the editors revise their headlines.

In the ethnographic case study mentioned in section 3.2. (Perrin 2006b), the Tages-Anzeiger consulting project, the comparison between experienced and inexperienced writers resulted in task-specific good practice models for whole writing processes and specific phases. One such practice by experienced journalists consists of first mapping out the main message and text organization and then writing the text in the order it is to be read, as much as possible without jumping back and forth or moving text blocks around. Extensive revisions under time pressure usually lead to text rifts: there is too little time to gain distance from the mental representations of old versions of the text. This and other production patterns were justified in trainings and practiced as variants instead of familiar patterns. Various methods, such as the “stage technique” and the “typo test”, helped participants improve their writing performance (outlined in Perrin and Rosenberger 2005). The stage technique, for the formulation phase of text production, can be summarized as: “to get back into your text after a break, just read the last two sentences, not the whole text from the beginning; this will help you formulate smooth transitions.” The typo test, for the revision phases, is: “change the general appearance of your text (e.g. font type and size, line width and spacing), then print it out and go somewhere else to proofread it; this will
help you recognize problems you did not see in the familiar layout and at the familiar place.” Such interventions are based on empirical insights concerning the interaction of writing and reading process in natural text production. However, they still fall too short.

5. Unexplored areas

Whereas it is now possible to track writing movements on the computer screen without disturbing natural writing processes, reading processes can only be assessed in a very indirect way. From certain writing movements, it can be assumed that authors revise their texts in certain locations. Following eye movements as well, so-called eye-tracking, has only been possible in laboratory settings until now (Andersson et al. 2006). Empirically solid analyses of the interaction between reading and writing processes during text production are definitely lacking for trainings (Wrobel 2000: 468). There is also little empirically-supported information available as to how cognitive and social influences intermesh in writing – and in learning how to write. As Rijlaarsdam et al. (2005: 149) put it: “Learning-to-write theories are an open field”. But even where more knowledge is available, such as the area of conversational analysis research, there is a lack of educationally concise models and visualizations of linguistic concepts (Becker-Mrotzek and Brünner 2004: 43). Finally, since educational offerings such as trainings can only resort to fragmentary parts of relevant knowledge, there is obviously also a lack of studies on the success of transfer of such knowledge in the applied fields (Fiehler 2002: 18; Hartung 2004).

Investments to determine practically applicable knowledge about text production would be worthwhile in two ways: for practical purposes – but especially for linguistics itself. In trans-disciplinary contact with non-academic subjects, linguistics can recognize which parts of texts language users identify as problematic, how they handle language, and how they reflect on their cognitive and social practices of language use. Language awareness becomes tangible, a linguistic research field of topical interest. Applied linguistics can ultimately profit from text consulting and text production trainings not only at the level of the knowledge they generate within the discipline itself but also at a meta-level. In academic-political terms, it is of importance what linguistic laypeople want to know about language and consequently where opportunities exist for knowledge transfer. Since applied research is increasingly justified by its broad acceptance, authors should not be the only ones to read their own texts.
References

Ackerman, J.

Alamargot, D. and L. Chanquoy

Allal, L., L. Chanquoy, and P. Largy (eds.)


Antos, G.

Baldwin, C. and G. E. Chandler

Bangert-Drowns, R. L.

Bauer, T. N. and L. B. Hammer

Baumann, M.

Baumann, J. and O. Ludwig

Beaufort, A.

Beaufort, A.

Beaufort, A.
Becker-Mrotzek, M.

Becker-Mrotzek, M.

Becker-Mrotzek, M. and G. Brüner

Begovich, R. S.
1993 Planning and implementing writing coach programs at small newspapers. Unpublished dissertation, Ball State University, Muncie, Indiana.

Bell, A.

Bereiter, C.

Berg, T.

Bergmann, J. R. and C. Meier

Björk, L., G. Bräuer, P. Stray Jorgensen, and L. Rienecker (eds.)

Bliesener, T.

Bolter, J. D.

Bracewell, R. J.

Bracewell, R. J. and J. D. Frederiksen

Brand, A. G.
Brand, A. G. and J. L. Powell

Bräuer, G.

Bräuer, G.

Bräuer, G.
2004 *Schreiben(d) lernen. Ideen und Projekte für die Schule*. Hamburg: Körber.

Bruning, R. and C. Horn

Bünting, K.-D., A. Bitterlich, and U. Pospiech

Burrough-Boenisch, J.

Charney, D., J. H. Newman, and M. Palmquist

Chin, E.

Coulson, D. and C. Gaziano

De Beaugrande, R.-A.

Dor, D.

Dörig, R.

Dörig, R.

Dürscheid, C.

Dysthe, O.
Endres-Niggemeyer, B. and H. Schott  

Euler, D. and M. Reemtsma-Theis  

Fiehler, R.  

Fiehler, R. and R. Schmitt  

Flower, L. S. and J. Ackerman  

Flower, L. S., J. R. Hayes, L. Carey, K. A. Schriver, and J. F. Stratman  

Flower, L. S., V. Stein, J. Ackerman, M. J. Kantz, K. McCormick, and W. C. Peck  

Freiman, M.  

Gabel-Becker, I. and B. Wingert  

Galbraith, D.  

Greenhalgh, T.  

Grésillon, A.  

Gunnarsson, B.-L.  
Gutenberg, N.

Gutenberg, N. (ed.)

Hansen, J.

Hartung, M.

Hayes, J. R.

Hayes, J. R. and L. S. Flower

Hayes, J. R., L. S. Flower, K. A. Schriver, J. F. Stratman, and L. Carey

Hayes, J. R. and G. J. Nash

Henry, J.

Henry, J.

Hermanns, F.

Herrmann, F. (ed.)

Hidi, S. and P. Boscolo (eds.)
Hyland, K.

Hyland, K.

Jakobs, E.-M.

Jakobs, E.-M.

Jakobs, E.-M.

Jakobs, E.-M.

Jakobs, E.-M.

Jakobs, E.-M.

Jakobs, E.-M. and S. Molitor-Lübbert

Jakobs, E.-M. and K. Schindler

Janssen, D., L. Van Waes, and H. Van den Bergh

Jeffery, G. and G. Underwood

Johnston, B.
Training of writing and reading

Keseling, G.

Keseling, G.

Keseling, G.

Keseling, G.

Klein, P. D.

Klemm, M.

Kretzenbacher, H. L.

Kruse, O.
2006 The origins of writing in the disciplines. Traditions of seminar writing and the Humbolditan ideal of the research university. Written Communication 23(3): 331–352.

Laakaniemi, R.

Laakaniemi, R.

Lalouschek, J.

Lambertini, L. and J. D. Ten Thije

Landis, D.
Levin, T. and T. Wagner  
2006  In their own words: Understanding student conceptions of writing through their spontaneous metaphors in the science classroom. *Instructional Science* 34(3): 227–278.

Levy, C. M., J. P. Marek, and J. Lea  

Levy, C. M. and S. Ransdell  

Levy, C. M. and S. Ransdell  

Lippmann, E.  
2006  *Coaching*. Heidelberg: Springer.

Ludwig, O.  

Ludwig, O.  

Marx, U.  

McCarthy Young, K.  

McGee, T. and P. Ericsson  

McLeod, S.  

Melchiorst, M., T. Van der Geest, and M. Steehouder  

Molitor, S.  
1984  *Kognitive Prozesse beim Schreiben*. Tübingen: Deutsches Institut für Fernstudien an der Universität.
Molitor-Lübbert, S.

Molitor-Lübbert, S.

Molitor-Lübbert, S.

Mönnich, A.

Nelson Spivey, N.


Olson, L. D.
1987 Recent composition research is relevant to newswriting. Journalism Educator 42(3): 14–18.

Ongstad, S.

Ortner, H.

Ortner, H.

Ortner, H.

Ortner, H.
Eva-Maria Jakobs and Daniel Perrin

Pajares, F.

Palaigeorgiou, G. E., T. D. Despotakis, S. Demetriadis, and I. A. Tsoukalas

Parks, S.

Perrin, D.

Perrin, D.

Perrin, D.
2006a *Medienlinguistik.* Konstanz: UVK [=UTB 2503].

Perrin, D.

Perrin, D.

Perrin, D., R. Dörig and P. Vervoort

Perrin, D. and N. Rosenberger

Pitts, B. J.

Pizarro, I.
2004 The efficacy of art and writing therapy. Increasing positive mental health outcomes and participant retention after exposure to traumatic experience. *Art Therapy* 21(1): 5–12.

Pogner, K.-H.
Training of writing and reading

Price, J.

Rau, C.

Reece, J. E. and G. Cumming


Rodríguez, H. and K. Severinson-Eklundh

Rose, M.

Rouet, J. F., M. Favart, D. Gaonac’h, and N. Lacroix

Ruffner, M.

Ruhmann, G.

Ruhmann, G. and D. Perrin

Russell, D.

Salovey, P. and M. D. Haar

Sauer, C.
Schmitz, U.

Schneider, B.

Schoonen, R. and K. De Glopper

Schriver, K. A.

Schriver, K. A.

Segev-Miller, R.

Selzer, J.

Severinson-Eklundh, K.

Severinson-Eklundh, K.

Severinson-Eklundh, K. and P. Kollberg

Severinson-Eklundh, K. and P. Kollberg

Sharples, M.
Sleurs, K., G. Jacobs, and L. Van Waes

Smagorinsky, P.

Smagorinsky, P.

Smiley, J.

Sommers, N.

Spilka, R. (ed.)

Spinnen, B.

Steinhoff, T.

Strömqvist, S., K. Holmqvist, V. Johansson, H. Karlsson, and Å. Wengelin

Surma, A.

Tapper, J.

Tench, R.

Torrance, M.

Trappen, S.
Uppstad, P. H. and A. K. H. Wagner

Van den Bergh, H., G. Rijlaarsdam, and I. Breetvelt

Van der Geest, T.

Van der Geest, T.

Van Waes, L.

Van Waes, L. and P. J. Schellens

Varner, D. and S. R. Peck

Williamson, M. M. and P. Pence

Wolf, R. and T. Thomason

Wolfe, J.

Wolfe, J.

Wrobel, A.

Wrobel, A.
Wrobel, A.  

Zaslow, R.  

Zhu, Y.  