Highlighting Professional Writing

On Screen Note-Taking as Part of Writing-from-Sources by Professionals

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HIGHLIGHTING PROFESSIONAL WRITING

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PROEFSCHRIFT

ter verkrijging van
de graad van doctor aan de Universiteit Twente,
op gezag van de rector magnificus,
prof. dr. W.H.M. Zijm,
volgens besluit van het College voor Promoties
in het openbaar te verdedigen
op vrijdag 22 december 2006 om 13.15 uur

door

Mark Sebastiaan Melenhorst
Geboren op 14 augustus 1979
te Olst

Dit proefschrift is goedgekeurd door
de promotor: **prof. dr. M.F. Steehouder**
en de assistent-promotor: **dr. T.M. van der Geest**

To those who did not have
the same opportunities as I had

Voorwoord

Een proefschrift schrijven is een proces vol tegenstrijdigheden. Boeiende discussies op hoofdlijnen tegenover gesteggel over details, deelnemen aan drukbezochte confe-renties tegenover solitair schrijfwerk, motivatie tegenover frustratie, het spreekwoor-delijke licht dat opgaat tegenover hoofdbrekens over een onmogelijk resultaat. Toch heeft dit complexe proces tot een resultaat geleid in de vorm van dit proefschrift.

Een voorwoord schrijven bij het proefschrift is misschien wel het moeilijkste onderdeel van het hele boek. Hoe doe je recht aan iedereen die in de afgelopen viereneenhalf een bijdrage heeft geleverd aan dit proefschrift? Immers, ik heb met velen gediscussieerd over dit onderzoek, ik heb diverse adviezen gekregen, ik heb hulp gekregen bij het oplossen van problemen, werk is me uit handen genomen, en niet in de laatste plaats heb ik een luisterend oor gevonden op momenten dat het tegenzit. Graag noem ik aantal mensen bij naam in de hoop niemand te vergeten.

Allereerst mijn familie. Dat ik heb kunnen studeren was voor mijn ouders een vanzelfsprekendheid. Zelf heb ik het altijd als een voorrecht beschouwd. De belangstelling en steun van mijn ouders en Rob, mijn broer, gedurende het hele traject tot aan deze promotie had ik niet kunnen missen.

Kick, in het jaar dat we elkaar kennen was je er altijd voor me. Je luisterde en gaf me vertrouwen als ik het even niet meer zag zitten, wat overigens niet alleen voor dit proefschrift geldt. Ik overdrijf niet als ik zeg dat ik niet weet of ik zonder jou dit promotieproject tot een goed einde had kunnen brengen.

Ook wil ik mijn vrienden bedanken. Het promotieonderzoek was in de afgelopen jaren niet het enige waar ik me druk over heb gemaakt. Ook op andere fronten was het niet altijd even gemakkelijk. Bij jullie vond ik zowel een schouder als welgemeende adviezen. Dank daarvoor!

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Met de verdediging van dit proefschrift sluit ik een periode van negen jaar – studie en promotieonderzoek – aan de Universiteit Twente af. Deze periode laat vele herinne-ringen achter. Leuke herinneringen als de collectieve snoekduik in het water van het Labyrinth der Zinnen, de periode in Seattle bij de collega's van University of Washing-ton en de gezelligheid op de afdeling. Het moeilijkste moment was ongetwijfeld het overlijden van Astrid Lips op 20 mei van dit jaar. Haar warme belangstelling voor mijn onderzoek en onze samenwerking rondom het digitale schrijfcentrum maken het bij-zonder spijtig dat ze het eindresultaat van mijn onderzoek niet zelf heeft kunnen zien.

Ik hoop dat dit proefschrift een waardige afsluiting vormt van de tijd die ik op de campus van de Universiteit heb doorgebracht.

Enschede, 15 november 2006

Mark Melenhorst

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Construction of a Framework for the Writing-from-Sources Process

Chapter 1

1.1 Complexity of Professional Reading and Writing

"Recently our firm had to draw up a tender for a pumping station's requirement specification. This was something new for my manager, but it child's play for me. He called me in, panicked by the enormous number of technical drawings, and hundreds of pages filled with text. On top of that, there was a set of standards, some implementation requirements, and so on. He had just 'started' reading. When I walked into his office, two hours after he had begun, I was immediately able to reduce the amount of information he needed to read, because I knew which documents were irrelevant. From the remaining 10% I could relatively easily distil the information I needed, because I knew what I could expect during the implementation phase"

– Martin, engineer, employed by a consultancy firm –

In this example the manager was faced with an unfamiliar, but very complex reading task. He became lost in the huge amount of information – he even panicked. Martin on the other hand was familiar with the task. His skills enabled him to extract only that information that he needed, resulting in a selection of only 10% of the information.

The amount of information Martin and his manager had to process is not untypical for professionals. Professionals in various disciplines are faced with comparable reading tasks. For instance, members of the Dutch House of Representatives receive on average 943 pages of paper each day (Neutelings, 2001), scientists read numerous articles as they attempt to stay up-to-date (Wyatt, 1993; Bazerman, 1985), prosecuting attorneys read extensive files of suspects (Van Duyne, 1983), and so on.

In these examples the goal of reading is to make some kind of decision:

- Martin, the engineer, had to decide on the price he could ask for the work (based on drawings and background documents).
- The parliamentarians had to decide on whether to ask a question in a parliamentary debate (based on a policy document).
- Scientists had to decide on the value of the information for the academic field (based on the article read).
- The prosecuting attorney had to decide on the indictment (based on the suspect's file).

Neutelings (2001) introduced the term 'reading-to-assess' to refer to reading with the purpose of making decisions such as in the aforementioned examples. Reading-to-assess is an extension to the common typology of reading goals beyond reading-to-do and reading-to-learn as proposed by Sticht (1977).

But what place do reading-to-assess tasks occupy in professional practice? Do professionals 'just' read and assess, or do they do more? Many professional tasks encompass more than reading alone. After reading, professionals often engage in some kind of writing task. Ultimately, academics read because they have to publish a paper, prosecuting attorneys have to record their decision in writing in an indictment, while members of parliament have to submit formal parliamentary questions by letter. The reading task then is not the end of the process, but only a part of the process. In such cases, professionals read one or more source documents in order to substantiate a new text: they *write from sources*.

Although writing-from-sources has received considerable attention in the literature, it has been predominantly studied using *students* as the subjects of investigation. Even though students learn how to use background information to substantiate their writings in college, writing-from-sources is more complicated in professional life, for a number of reasons:

- Writers have to pay more attention to the rhetorical situation in a professional setting than they would in an educational setting (for instance, writers have to consider the political implications of what they are writing).
- The amount of information that has to be processed is far greater in professional settings than it is in education.
- The time pressure under which the text has to be written is more severe in professional settings.

Writing-from-sources as performed by professionals is a complex task. Combining information from multiple sources, and transforming that information into a text that fits the needs of the reader demand a lot from the author's skills – we have seen some anecdotal evidence for that in the case of Martin and his manager.

Taking notes is one of the strategies that professionals may use to cope with the complexity of the process. When they store their thoughts in their notes, they free up space in their minds and are able to concentrate more throughout the process. When taking notes, it is easier to re-read documents, whereas the action of taking notes in itself helps the reader to understand the information. Taking notes is common practice for readers in general and professionals in particular. For instance, after a scientist has read a printed academic article, the paper is often covered with highlighted passages, critical remarks on the methodology that have been scribbled in the margins or between the lines, and any other self-invented convention that indicates, for instance, which information should be included in an article to be written. Taking notes is not only part of a reader's habitual reading practices, but it can also help writers cope with the complexity of writing-from-sources. Note-taking can be an intermediary process between reading and writing.

An illustration of the importance of note-taking comes from the aftermath of a fire that destroyed our building at the University of Twente in 2002. It destroyed a substantial part of every scientist's collection of articles. Retrieving these documents from electronic archives – though occasionally difficult – was relatively easy compared to the retrieval of the notes that had been written on the printed articles themselves. The notes were of course irrecoverable. In fact, these notes were external representations of a scientist's body of knowledge. Not only did the fire destroy the articles, it also destroyed the cues to a scientist's knowledge.

In sum, writing-from-sources is a complex, but commonly performed task for many professionals, involving reading and evaluation of source materials, taking notes, and the composition of a new text that accomplishes distinct rhetorical goals.
Existing research on professional reading, note-taking, and composing can help us to identify the variables that affect the reading, note-taking, and composition process as the assumed subprocesses of writing-from-sources. Based on the research on reading, note-taking, and composing we will be able to formulate a tentative framework of the writing-from-sources process. In Section 1.2 we will address research on (professional) reading and composition, while in Section 1.3 the available research on note-taking is addressed.

Substantial changes have taken place in the processes of reading, composing, and note-taking over the last two decades. The computer has changed first the composition process, and later on also the reading process due to an increasing availability of digital information. With this increased availability, the need for taking notes on screen is growing – some digital note-taking tools are already available.

While some (even though limited) research is available on on-screen reading and composing, the processes of reading, composing, and note-taking are still not fully understood. Therefore, we will address the implications of a digital environment for writing-from-sources tasks in Section 1.4.

Even though isolated reading, note-taking, and composing research is relevant, it does not inform us about the writing-from-sources process. Hence we will address specific writing-from-sources studies in order to identify the factors and process characteristics that influence the way in which writers approach a writing-from-sources task. After outlining the scope and aim of this thesis in Section 1.5, we will address writing-from-sources research in the remainder of this chapter.

1.2 Reading and Composing by Professionals

1.2.1 (Professional) Reading

In examining the existing research on reading by experienced professionals, we can characterize professional reading as:

- Active
- Purpose-driven and hence selective
- Strongly influenced by prior knowledge

Active reading

Early research on the reading process by Adler & Van Doren (1972) has shown that the reading process is highly active for skilled readers such as professionals. Reading cannot be perceived as the passive processing of text. Rather, skilled readers are actively involved with the source materials, by taking notes, and by drawing relationships with their prior knowledge.

Several studies have provided evidence for this claim. Pressley & Afflerbach (1995) underline the active nature of the reading process by means of their review of 32 verbal protocol studies among various types of readers, including professionals. They have observed that skilled readers are engaged in "extensive and salient monitoring and evaluation processes as they read." (p. 94).

They found that readers actively search for meaning and reflect on the text in the light of their prior knowledge. Before, during and after reading, they apply a range of strategies to identify the main ideas from the text. They often work with an initial hypothesis about the main ideas of the text, evaluate it during reading, and respond to the text with new predictions that are based on their prior knowledge.

Purpose-driven and selective reading

The common denominator of studies on professional reading is that they emphasize the purpose-driven nature of the reading process. Bazerman (1985) observed and interviewed seven physicists who were reading research articles. The selective reading he observed was directed by the purposes they had (i.e. placing the new information in their personal 'map of the field'). The readers scanned abstracts and tables of contents very quickly, until a particular word or name triggered their attention. They looked at the introductions and conclusions, scanned the figures, and jumped back and forth through the text, to notice things that they considered new. They took notes while reading, and scribbled evaluative comments in the margins of the texts. As such, taking notes proved to be a natural part of the reading process.

Because skilled readers are highly purpose-driven, they only need to read a small part of the source documents. Both Neutelings (2001), reporting on Dutch legislators reading and assessing policy reports, and van Duyne (1983) who described the reading processes of Dutch prosecutors, showed how these professionals come to a decision quickly by using a relatively small part of the information available.

Van Duyne (1983) found that readers could achieve such a high level of efficiency by reducing the complexity of the case to only one or two dimensions that need evidence. Readers also proved to formulate a provisional decision and then collect evidence to support or reject that decision. Prosecuting attorneys inferred the details of the situation by reading key elements of the suspect's file, while they sought to verify these inferences by reading more information from the file.

Prior knowledge

The results from studies on professional reading suggest that there are at least three different types of prior knowledge that play a role during reading.

- Knowledge of reading strategies
- Knowledge of discourse type
- Knowledge of content

The influence of a reader's *knowledge of reading strategies* is discussed by Wineburg (1998). She observed two historians with different expertise reading multiple documents with the purpose of reconstructing a historical event. Each historian demonstrated a different type of prior knowledge and expertise. The less experienced scientist demonstrated the ability to construct an interpretative scheme quickly by means of which he could interpret the historical events. This requires an awareness of the *reading strategies* that can be employed to construct meaning of historical events from a collection of sources.

Knowledge of discourse type affects the reading process. It seems to be the primary force that enables professionals to read very selectively. The importance of knowledge of discourse type is addressed in Bazerman (1985) and Charney (1993). Even though the number of participants is rather small, and no comparison has been made between experienced and less experienced readers, these studies provide strong indications of the influence of knowledge about discourse

types. Bazerman (1985) found that scientists primarily scanned for terms in the titles, abstract, and table of contents. These keywords were considered in terms of their personal map of the field (referred to as schema) in order to decide whether it was worthwhile to continue reading.

In contrast to Bazerman (1985) who observed participants engaged in their own research activities, Charney (1993) provided an article to her readers. She observed fourteen scientists reading an unconventional scientific article. She found that readers' knowledge of the academic genre enabled them to accomplish their reading purposes rather than being directed by the article's rhetorical strategies to convince its readers.

Content knowledge enables readers to elaborate on the text in the sources, and to maintain a critical stance towards the sources. In studying two expert historians, Wineburg (1998) found that one of her participants brought a large amount of content knowledge. This enabled him not only to reconstruct a complex historical event quickly, but also to elaborate on the sources by drawing relationships with other events and competing interpretations of these events.

Charney (1993) showed that even though the genre was unfamiliar to scientists, they continued to use their knowledge of science, scientific texts, and of the specific scientific debate at hand. Her readers seemed to use this knowledge to keep a critical stance towards the article, in spite of its highly unconventional structure.

Prior knowledge does not influence just the reading *process*. Bazerman (1985) has shown that prior knowledge also interacts with the reader's *purposes*. Based on his analysis of think-aloud protocols of seven physicists engaged in a reading task, he concluded that "schema are formed around the active research purposes of the reader. Equally, purposes are framed within the researcher's schematic understanding of the field". In other words, prior knowledge (stored in personal maps of the field, referred to as schemata) influences and is influenced by the purpose of reading.

Professional Reading from a Writing-from-Sources Perspective

The insights we have gained from research on professional reading as described in this section shed light on the manner in which professionals evaluate sources when they are confronted with a professional writing-from-sources task. But some methodological choices may prevent us from applying professional reading research to a writing-from-sources context:

- *Number of participants in the studies*
  The number of participants in the professional reading studies is rather small, sometimes even no more than two cases (i.e. Wineburg, 1998). Such a small number makes it difficult to generalise to professional reading in general. Application to a writing-from-sources setting could then be precarious.

- *The type of reading tasks*
  The majority of research on professional reading has been undertaken with scientists as participants. Tasks in a non-academic context may require different reading and evaluation strategies. The reading tasks in a non-academic setting may be far more specific and purpose-driven than reading tasks in academic settings (e.g. Bazerman, 1985; Charney, 1993). The role of prior knowledge is likely to be different when a more specific task is provided.

- *The use of the reading results are not discussed*
  In research on professional reading, the reading task is a goal in itself. In writing-from-sources, reading is a subprocess that is instrumental to another goal: the composition of a new text in order to solve a certain rhetorical problem. This ultimate goal is likely to change the nature of the reading process.

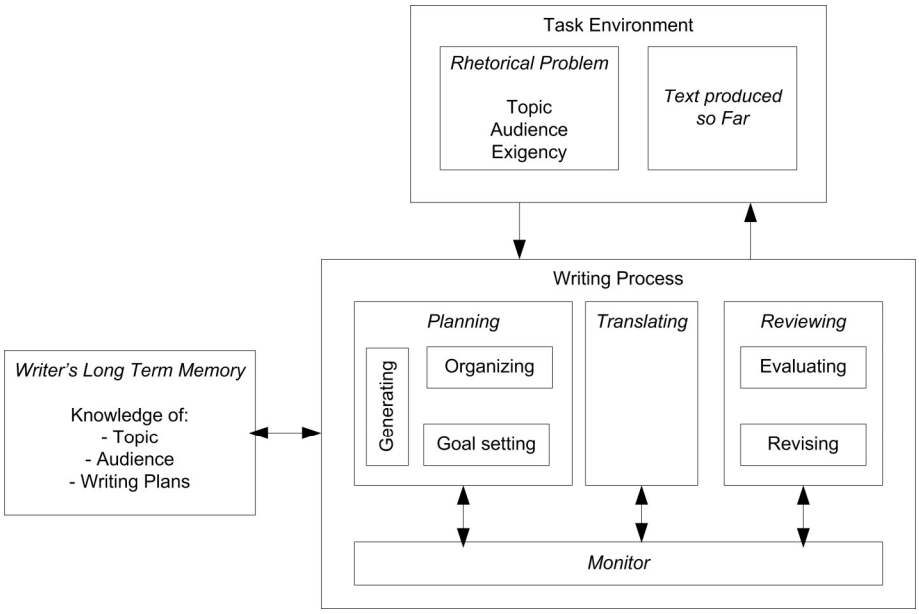
The active, purpose-driven, and prior knowledge-driven nature of the reading process should be investigated within a writing-from-sources context to test whether the characterisation of the reading process is also applicable to the subprocess of reading within a writing-from-sources task.

1.2.2 (Professional) Composing

Whereas a (relatively small) body of research is available on how professionals read, our understanding of how professionals *compose* is also quite limited. The vast majority of composition research is conducted in an educational setting. It is aimed at the acquisition or improvement of writing skills. Here we sketch the influential models of Flower & Hayes (1981) and Bereiter & Scardamalia (1987). Subsequently, we evaluate their value for research on professional writing-from-sources.

Flower & Hayes (1981)
Flower & Hayes (1981) have developed an influential model of the writing process that is rooted in problem-solving theory (Newell & Simon, 1972). From this perspective, writing is perceived as a goal-directed problem solving activity. Their universal model of the writing process is based on verbal protocol studies conducted with students as participants. The model is depicted in Figure 1.1.

Figure 1.1 Writing process according to Flower & Hayes (1981)



The model has been adapted by Hayes (1996). But because the original model is most often referred to, we will address the original model. Below we describe the most important components of the model.

The *task environment* consists of the *rhetorical problem* the writer has to solve and the text produced so far. The rhetorical problem is the mental representation of the *rhetorical situation* joined with the writer's own *personal goals*, such as using correct spelling and grammar. According to Flower & Hayes (1981), the *rhetorical situation* is given. It consists of the *exigency* (i.e. the reason for writing), the *audience* (the potential readers), and the constraints (such as time available and the desired format of the composition).

Flower (1990) has conducted an initial attempt at applying Flower & Hayes's (1981) model to the writing-from-sources context – referred to as reading-to-write. She has elaborated on the notion of task representation. She refers to task representation as an "interpretive process that translates the rhetorical situation – as the writer reads it – into the act of composing. As such, it is the major bridge linking the public context of writing with the private process of an individual writer." (Flower, 1990, p. 35). She argues that the task representation is:

- actively constructed rather than chosen
- subject to change over time
- extended throughout the process, because writers notice cues from the context based on which they evoke relevant memories

The concepts of the rhetorical problem (Flower & Hayes, 1981), and task representation (Flower, 1990) overlap to some extent. However, the concept of task representation includes the step from the interpretation of the rhetorical situation to the act of composing, which involves the formulation of writing and – in writing-from-sources – reading goals. Furthermore, task representation is defined as a continuing process rather than as a static representation, which is suggested by Flower & Hayes (1981) with their interpretation of the rhetorical problem concept. Therefore, hereafter the term *task representation* is used.

The *planning process* consists of generating ideas, analysing, and goal-stetting. The presence of a planning process demonstrates the problem-solving nature of the writing process. The writing problem is divided into subproblems that constitute writing goals, resulting in a hierarchical system of goals and plans.

The *translating* process involves putting the ideas into words. That is, it is the act of composing in itself.

The *reviewing process* is an illustration of the cyclical nature of the writing process: texts are not written from a blank sheet of paper to a submittable version within a single round. Writers evaluate and revise their texts based on the rhetorical situation and the writer's personal goals.

The introduction of the *monitor* as the control unit of the subprocesses emphasizes the recursive nature of the writing process, in which no predefined phasing of the writing process can be perceived. The monitor functions as a writing strategist which determines when the writer moves from one process to the next (Flower & Hayes, 1981, p. 374). Thus, it controls the switches between the subprocesses of planning, translating, and reviewing.

The *long-term memory* refers to all knowledge a writer can use for his composition. Flower and Hayes pay relatively little attention to the role of prior knowledge in composition. It functions as a "storehouse of knowledge about the topic and audience, as well as knowledge of writing plans and problem representations" (Flower & Hayes, 1981, p. 371). In contrast to research on

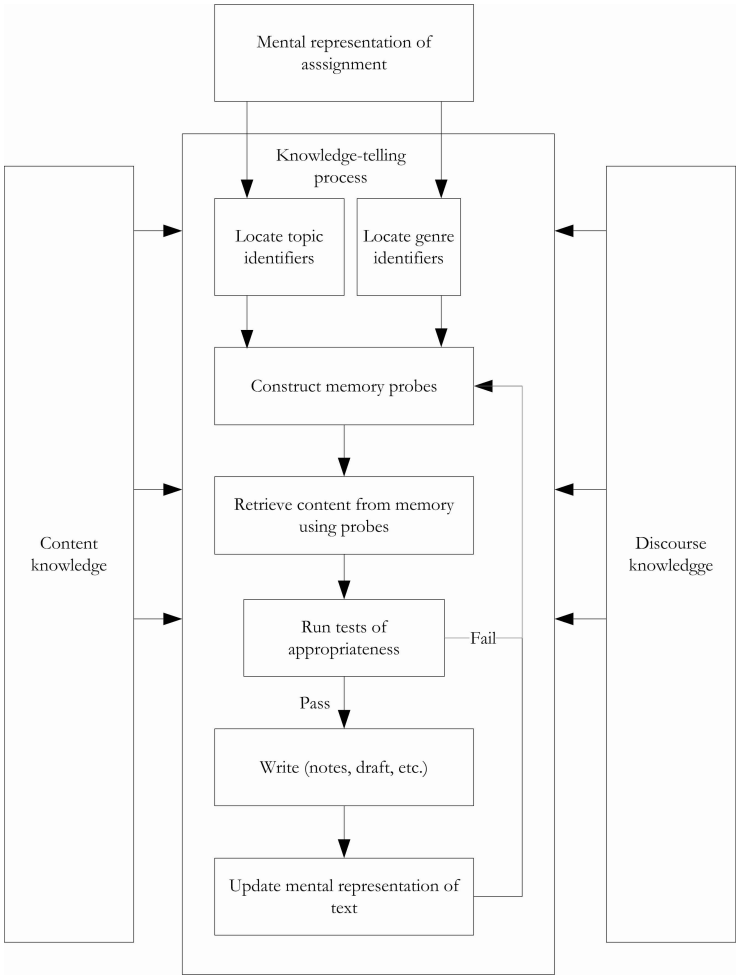
professional reading, in research on composing the role of prior knowledge is not identified as a factor that influences the process to a large extent.

Bereiter & Scardamalia (1987)

Based on their analysis of the composition process among students of various age groups, Bereiter & Scardamalia (1987) conclude that there can be no such a thing as a universally applicable model of the composition process, as implied by Flower & Hayes (1981). Bereiter & Scardamalia (1987) acknowledge that less experienced writers take a different task approach than more experienced writers.

This conclusion led them devising two models of the composition process. Based on thinking-aloud studies of students of various ages engaged in a composition task they argue that expertise in writing grows over time from knowledge-telling to knowledge-transforming. In figure 1.2 the knowledge-telling model of the composition process is displayed.

Figure 1.2. Knowledge-telling model of the composition process (Bereiter & Scardamalia , 1987)

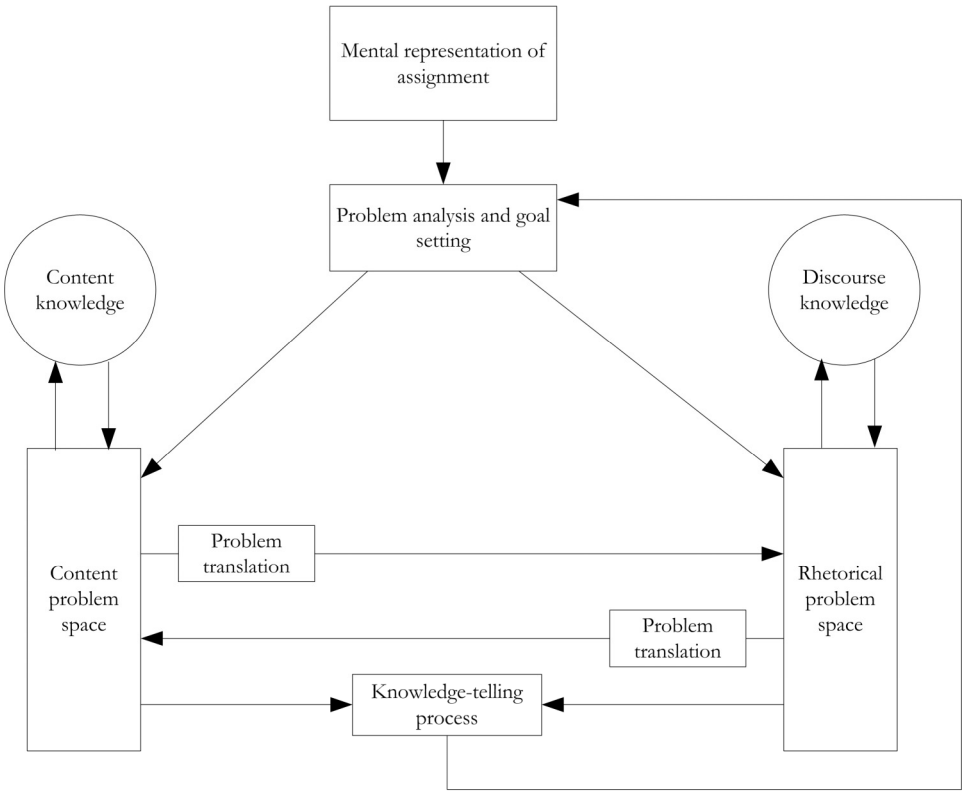


As can be seen from Figure 1.2, a knowledge-telling approach involves a relatively low-level processing of the assignment, based on cues that point to a certain topic and a certain genre. These cues are referred to as topic identifiers and genre identifiers respectively. These act as probes that activate related concepts in memory. Based on these concepts content is retrieved from memory, which is ultimately translated into written text. Although the writer is aware of the genre to which the text to be written belongs, the rhetorical situation is not explicitly considered. The knowledge-telling process for novices is summarized as:

> "For novices, composing a text is a matter of generating a series of appropriate content items and writing them down." (p. 16)

Even though this is an efficient strategy in the sense that it produces a moderately satisfying text that meets the criteria regarding the topic and genre of the text, it lacks a thorough assessment of the rhetorical situation. The rhetorical situation plays a significant role in the knowledge-transforming model. The model is displayed in Figure 1.3.

Figure 1.3. Knowledge transforming model of the composition process (Bereiter & Scardamalia, 1987)



As can be seen from Figure 1.3, the process of knowledge-transforming is more complex than knowledge-telling. The knowledge-transforming model is in fact an extension of the knowledge-telling model. Whereas in knowledge-telling the content problem is at the core of the composition process, in knowledge-transforming the writing problem encompasses also a rhetorical problem: the assessment of the rhetorical situation and the needs of the reader. Knowledge-telling still plays a role, but only as part of the writer's approach to solving the rhetorical problem. Thus, solving the content problem by knowledge-telling is *instrumental* to solving the rhetorical problem. In order to solve both the content problem and the rhetorical problem writers are more likely to engage in taking notes, planning, and revising content.

Bereiter & Scardamalia (1987, p. 17) summarize the knowledge-transforming process as follows:

> "For more expert-like writers, however, composing is a complex goal-directed activity, significant parts of which do not involve the actual generation of text content or language".

Bereiter and Scardamalia have found various manifestations of the distinction between a knowledge-telling and knowledge-transforming approach that are related to the following process characteristics:

- *Effort spent at the start of the task*
  Writers who tell knowledge spend less effort on the start of the process, whereas for writers who transform knowledge the effort they spend at the start of the task depends on the task, the complexity, the goals of the writer, and the time available. It would appear that what writers do at the start of the process has a large influence on the course of the process.

- *Cognitive processes other than formulating*
  The distinction between knowledge-telling and knowledge-transforming is also visible in the cognitive processes writers engage in apart from formulating text. Analyses of the verbal protocols have shown different patterns of thought for writers who take a knowledge-telling approach and for writers who take a knowledge-transforming approach. For writers that take a knowledge-telling approach there is a large resemblance between what they think and what is observable from the text they are writing while they engage in little additional thought. However for writers who take a knowledge-transforming approach, this resemblance is much smaller, since they engage in much more reflective thought, such as generating provisional ideas, setting goals, and so on.

- *Nature of the revision process*
  Writers who take a knowledge-telling approach engage in a less extensive revision process, while their revisions consist mostly of cosmetic changes. Writers who take a knowledge-transforming approach engage in more revisions, and revisions of a level beyond cosmetic changes.

- *Note-taking*
  An important activity that distinguishes writers who tell knowledge from writers who transform knowledge is note-taking. Writers whose approach can be characterized as knowledge-telling take notes as if the notes were the first draft of the final text. Their notes are analysed in a linear manner. In contrast, the notes of writers who transform knowledge contain non-verbal symbols (such as arrows), comments on ideas, and

other types of notes not intended to form part of an eventual text. For these writers, the notes are analysed in a non-linear fashion. Thus, the content and the analysation of the notes are observable characteristics of the writers' task approach.

The knowledge-telling and knowledge-transforming models need to be treated with a measure of caution. Bereiter & Scaradamalia (1987) acknowledge that these models are in fact two relatively extreme representations of approaches to the writing task. Another model could easily be added somewhere in between the extremes of knowledge-telling and knowledge-transforming. As such, these models should be considered as ends of a continuum rather than as a dichotomy. Nevertheless, they provide a valuable point of reference that is used here to characterize writers' task approach.

Professional Composition Processes from a Writing-from-Sources Perspective

To what extent are the models of the writing process valuable for research on the writing-from-sources process by professionals? Flower & Hayes (1981) claim that their model of the composition process is valid beyond classroom settings. Their analyses should be applicable to professional writing processes as well. However, this claim has been questioned by Bereiter & Scardamalia (1987): they argue that when writing skills develop, the writer's approach changes from retrieving content from memory (knowledge-telling) to solving a rhetorical problem (knowledge-transforming). As such, Bereiter & Scardamalia's models can be considered development models of the writing process.

Flower & Hayes (1981) assume that the rhetorical situation is a fact. But in a *professional* setting this assumption cannot persist. Whereas in education the assignment is general-ly relatively obvious about who the intended reader is (the teacher or, alternatively, an imagined reader) and the exigency (an assignment), in professional situations writers are faced with far more uncertainty regarding these aspects of the rhetorical situation. This is the case for professional discourse types such as advisory papers, or parliamentary questions in writing, and so on. Consequently, determining the audience and the exigency may require substantial reflective thought.

It is imperative for writers in a professional context to develop a fine grained understanding of the rhetorical problem. The complexity of the rhetorical problem demands a knowledge-transforming approach to the writing-from-sources task. It may be expected that writers are able to engage in such an approach because of their often longstanding experience with the writing problems they are confronted with.

Whereas Bereiter & Scardamalia (1987) introduce a mutual relationship between prior knowledge and the problem space (see Figure 1.3), Flower & Hayes (1981) assign less importance to prior knowledge. However, in professional settings the role of prior knowledge is far greater than Flower & Hayes's (1981) model suggests. In professional reading research (see Section 1.2.1) prior knowledge is a driving force in the process. It is likely that in professional writing prior knowledge regarding discourse type, content, and rhetoric plays a significant role as well.

Even though the validity of the writing process models in a professional writing-from-sources context has not yet been established, both Bereiter & Scardamalia (1987) and Flower & Hayes (1981) provide valuable theoretical notions by means of which – mutatis mutandis – the writing-from-sources process can be conceptualised. In parti-cular the role of the rhetorical problem, the task representation, the monitor and the recursive nature of the process are important concepts for understanding the writing-from-sources process.

However, neither Bereiter & Scardamalia (1987) nor Flower & Hayes (1981) specifically address the manner in which *professionals* carry out writing-from-sources tasks since their models are focused on writing in isolation and are based on observing students. Research is needed that investigates the process of writing-from-sources carried out by professionals.

1.3 Note-Taking

1.3.1 Note-Taking as Subprocess in Writing-from-Sources

Research on professional *reading* has shown that note-taking forms a part of the professional reading process (Bazerman, 1985), while Bereiter & Scardamalia (1987) have shown that note-taking is a process characteristic that discriminates between different approaches to a *composing* task. Since the writing-from-sources process consists of reading and composing, and since note-taking is important for both subprocesses, it is likely that note-taking plays a significant role in writing-from-sources, in which both processes are combined.

One possible role may be the linking of the reading and composition process. Note-taking not only serves the purpose of facilitating the processing of text, but also the preparation for another task. In research on note-taking, this is often a test, or a free-recall task. In writing-from-sources, writers prepare for their composing task by reading, but possibly also by taking notes.

However, little research attention has been paid to the role of note-taking as aid to processing or as preparation for a writing task. Some educational research is available in which the benefits of taking notes are investigated in terms of its potential effects on learning. Even though the context is rather different, research on note-taking in education may reveal worthwhile insights into the role note-taking can play.

Educational research has shown that note-taking may fulfil two not mutually exclusive functions: an encoding function, stressing the additional processing that results from taking notes, and an external storage function, emphasizing the beneficial effect of storing and reviewing notes.

1.3.2 Encoding Function of Note-Taking

The majority of the research on note-taking is conducted within an educational setting, with little attention being paid to professional note-taking. Research efforts have often been directed at the potential benefits of note-taking with a view to improving students' study strategies. In such research, students may take notes on orally delivered information (for instance in lectures or in video-tapes), or on information in texts.

Research on note-taking during lectures shows that the main function of note-taking is the *encoding function*. The encoding function of note-taking refers to the benefit that is gained from the mere act of taking notes in itself. Di Vesta & Gray (1972, p. 8) argue that notes as an encoding mechanism enable students to "transcribe whatever subjective associations, inferences, and interpretations occurred to [them] while listening". As Peper & Meyer (1986) argue, the activity of taking notes during the lecture makes students engage in more generative processing than listening to the lecture alone: note-taking encourages students to build connections between what is presented and what they already know.

But not all activities of note-taking result in an equal amount of generative processing. Kiewra et al. (1995) compared the effectiveness of different manners of organizing notes for students who were listening to a lecture in preparation for a writing assignment. Taking notes

on an outline or a matrix outperformed unorganised note-taking in terms of the number of lecture points included in the notes and in terms of recall. Apparently, the organization of the notes has an effect on performance.

It is not only the organization of the notes that influences performance. Van Hout-Wolters (1986) investigated the extent to which learners benefit from highlighting passages in the text, or from using passages that were highlighted by the teacher. Students who highlighted passages themselves recalled significantly more from the text than students who were able to use the teacher's highlights. Students who used the teacher's highlights in turn performed better than students who could not highlight passages at all. Students even benefit from notes that only direct the reader's attention towards specific passages. Apparently, highlighting is a useful strategy for learning from a text.

1.3.3 External Storage Function & Distributed Cognition

The beneficial effect of temporarily storing information on paper has been acknowledged by research with students who take notes during a lecture. Di Ves-ta & Gray (1972) argue that recording written transcriptions of what has been read or thought serve an external storage function. Research on the external storage function of note-taking primarily addresses the effect of reviewing the stored information. Kiewra et al. (1995, p. 240) for instance summarize the external storage function with the claim that "the review of notes stored in a written form facilitates performance". However, external storage is not only effective because of reviewing a written transcription of lecture content, but possibly also because there is less need to remember every piece of information: the cognitive load is reduced.

The claim that the cognitive load of remembering information is reduced when notes are taken is in fact the basic claim that can be derived from the Distributed Cognition framework, as proposed by Hutchins (1995a), even though this framework is formulated on a more abstract level than research on the note-taking process. Nevertheless, the explanation for the external storage function of note-taking has the same roots in information processing theory as the Distributed Cognition framework: the effect of reducing the load imposed on short term memory.

Hutchins (1995a) observed how pilots interacted with switches, displays, and other equipment in an airliner's cockpit. Based on ethnographic research, he argued:

> "…systems that are larger than an individual may have cognitive properties in their own right that cannot be reduced to the cognitive properties of individual persons"
> *(Hutchins, 1995b, p. 266).*

In other words, it does not suffice to examine the cognitive processes of individuals in isolation. Whereas cognitive research in general considers the cognitive processes an individual is engaged in, the Distributed Cognition framework considers cognition to be part of a system that comprises more than the mind of an individual alone. The environment is part of the cognitive processes that the individual is engaged in. In an airliner's cockpit, the environment may contain artefacts such as controls and displays.

Hutchins (1995a) refers to the involvement of artefacts from the environment in cognitive processes as the distribution of cognition. According to Hollan, Hutchins & Kirsh (2000), who summarized the principles of Distributed Cognition, cognitive processes can be distributed between individuals, between individuals and artefacts, or between different moments in time.

For all three different types of distribution, the key principle is that people seek to reduce the load imposed on their memory by using the environment whenever possible. External artefacts are hypothesized to decrease the required cognitive resources.

If we perceive notes as external artefacts, then the Distributed Cognition framework can provide a valuable perspective for analysing the potential role of note-taking. In note-taking, the system comprises the individual who is reading, the documents that are being read, and the notes that are taken. By storing information in the notes, they have less to keep in mind while reading and composing, which reduces the cognitive load imposed on their memory when they are performing a task such as reading, writing, or – in this case – writing-from-sources.

In conclusion, the encoding function and the external storage function of note-taking suggests that in writing-from-sources writers can respectively improve their processing of reading materials in preparation for composing as well as reduce the cognitive load of the task by using the notes to store the information they need for the final composition. However, the specific role of note-taking in a writing-from-sources context rather than an educational context needs further investigation.

1.4 The Influence of a Digital Environment

In the previous sections we have assumed that the processes of reading, writing, and note-taking are carried out on paper. But this assumption can no longer be taken for granted since the introduction of the computer as a writing tool, and later also as a reading, and note-taking tool. Reading, note-taking, and composing as the assumed main processes of writing-from-sources may take a different course when they are carried out on screen. In this section we will (briefly) examine the effects this switch to a medium other than paper has on reading, note-taking, and composing.

The materials that writers are required to read in order to substantiate their writings are increasingly being made available in digital form, for instance as Web pages, PDF files, or CD-ROMs. In the world of science, articles are made available through abstract databases and full-text databases. In public administration, documents are not only printed on paper, but also published on the Web. However, documents are not only published in digital form complementary to publication on paper. Numerous documents are published *exclusively* in digital form, because the documents are too large, or need to searchable so that information can be retrieved efficiently. For instance, the Website Overheid.nl contains thousands of pages with information from all levels of public administration. For such information systems, documents cannot be easily printed on paper, whereas efficient mechanisms such as sitemaps or search engines are available to retrieve the required information from the systems. *Reading* from computer screens is then necessary, in spite of technologies that attempt to emulate paper, such as flexible displays.
Experimental evidence is available that indicates that reading from the screen is slower and less accurate than reading from paper (Dillon, 2004). But much less is known about how people read from the screen when they carry out a *real-life* task: a more realistic conceptualisation of human reading on screen is required (Dillon, 2004, p. 69). If we were to observe the on-screen reading process as part of a real-life task, we would be able to draw more valid conclusions on the nature of on-screen reading by professionals.

Taking notes on screen is also far more difficult than on paper. Easily writing down comments or underlining passages has only recently been possible. Although advanced software is available to enable people to take notes on screen, its ease of use hardly compares with the ease of taking notes on paper (O'Hara & Sellen, 1997). Taking notes on screen is more obtrusive than taking notes on paper, because on screen a deliberate shift in attention from reading to taking notes is required, while taking notes on paper is actually part of the reading process (O'Hara & Sellen, 1997; O'Hara et al., 2002).

The act of *composing* using a computer preceded the increasing availability of documents in digital form. For almost every writing task, writers have started to use computers rather than paper or a typewriter. This switch from paper to computer involved more than just a change of writing tool. As shown by Van Waes (1991), it also appeared to change the composition process itself. Writing on screen in general sped up the process by virtue of a smaller amount of time being dedicated to initial global planning, and more time being devoted to local planning. The process became more recursive in terms of alternations between formulating and revising. In addition, the revisions that writers made took place more frequently on a local level and less frequently on a global level.

Although reading, taking notes, and writing are significantly affected by the on-screen environment, little is known about how professionals carry out a writing-from-sources task in a completely on-screen environment, let alone about the role that on-screen note-taking can play during this process.

1.5 Research Questions and Aims of this Thesis

In the previous sections we have characterized writing-from-sources as a very complex task, but also as a task that has yet to be fully explored by means of empirical research.
We know even less about how writing-from-sources tasks are carried out on screen in spite of its increasing prevalence in professional life.

In this thesis, we investigate this issue of *professional* and *on-screen* writing-from-sources tasks. We will conduct a study in a completely on-screen environment, with profess-sionals as participants. Because note-taking has been presented as being one of the opportunities for reducing the complexity of the writing-from-sources process, our objective is to explore how professionals approach such an on-screen writing-from-sources task, and what contribution *taking notes* can make to this process. We seek to answer the following research questions:

- What are the purposes of note-taking?
- Which activities comprise note-taking?
- How are source documents and notes used as arguments in the text to be written?
- What is the relationship between taking notes and the quality of the text to be written?

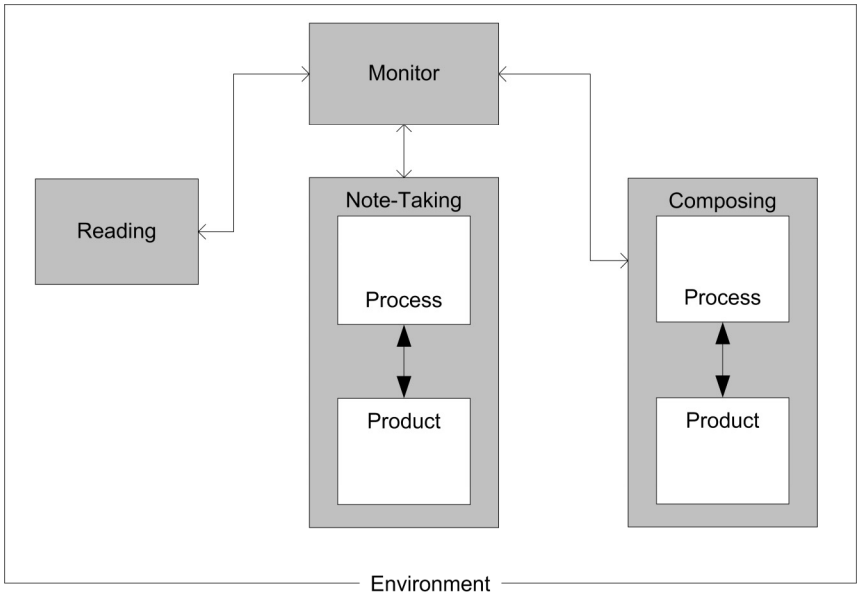
In the next sections we will first devise a tentative framework of the writing-from-sources process that is based on the assumed subprocesses that were described in Section 1.2 and 1.3: reading, note-taking, and composing. Next, we will assess specific research on writing-from-sources with the purpose of elaborating this framework. This theoretical framework will be the point of reference for our research, which constitutes a research agenda.

1.6 Tentative Framework of the Writing-from-Sources Process

No leading theories have as yet been formulated that comprehensively describe the writing-from-sources process and explain the factors that influence it. In the previous sections, reading, note-taking, and composing were indicated as being the processes that constitute writing-from-sources. The task of writing-from-sources requires writers to read information from sources, take notes if deemed useful, and compose a new text. Reading, note-taking, and composing are conceived here as the subprocesses of writing-from-sources.

From the description of the main theories on reading and writing, a tentative framework can be constructed that will be elaborated in the remainder of this chapter by discussing studies on the writing-from-sources process itself. The tentative framework is displayed in Figure 1.4.

Figure 1.4 Tentative framework of the writing-from-sources process



As is the case in Flower & Hayes's (1981) model of the writing process, a monitor is included in the framework. The monitor is the mechanism that controls the process. It is in fact the instantiation of the writer. However, in contrast to Flower & Hayes (1981), the monitor in this framework includes planning and goal-setting, whereas these are separate model components in Flower & Hayes (1981). But in Flower & Hayes (1981), the planning and goal-setting process are both located within the writing process. Writing-from-sources encompasses reading, writing, and note-taking. Goal-setting and planning should not be located within composing, note-taking, or writing, but should be located on a higher level above all subprocesses. Therefore, planning and goal-setting were generalized to the writing-from-sources process as a whole and incorporated into the monitor to simplify the model.

We distinguish between process and product for both note-taking and composing. The process refers to what writers actually do throughout the reading, note-taking, and writing processes. Note-taking generates an output of written notes. The composition process results in a written text. Process and product of both the note-taking and composing process are strongly interrelated. Imagine, for instance, an author who creates a note about which parts of a text he still has to read and take notes on. The product of the notes is then input for the process. To depict the relationships between process and product in our theoretical framework, we drew bidirectional relationships between process and product of composing and note-taking.

Following Flower & Hayes (1981), the writing-from-sources process is considered highly recursive, as depicted by mutual relationships between process and product of composing and note-taking, as well as between the monitor and each of the subprocesses. The author is constantly switching back and forth between reading and writing. For instance, the author may come up with additional questions during the composition process for which he may consult the sources. Note-taking may result in new ideas for which the author needs to find evidence in the sources before he translates these ideas into written text. The arrows display the recursive nature of this process.

We have added the environment in which the task is carried out to our tentative framework. From a Distributed Cognition perspective (Hutchins, 1995a), a writing-from-sources task is not carried out in the mind of an individual alone. The task is conducted within an environment that writers manipulate to complete their task. The environment comprises the material artefacts that can be used to accomplish the writing-from-sources task, including, for instance a desk or the software to be used to compose a text. This environment has been added to our tentative framework of the writing-from-sources process.

The resulting framework of the writing-from-sources process is our frame of reference for the literature discussion that is described in the remainder of this chapter (Sections 1.7 to 1.11). By assessing earlier research on writing-from-sources, we seek to elaborate this framework and explicate the relationships between the components of the model. We will derive the research questions for this thesis from the elaborated model of writing-from-sources.

1.7 General Characterization of the Writing-from-Sources Studies

Whereas in the previous sections we addressed research on reading, composing, and note-taking in isolation, in the following sections we will address specific writing-from- sources research. To interpret its merits, we will first characterize the writing-from-sources studies.
The selection of the studies discussed hereafter as well as their methodologies are outlined in Appendix A. In this section we will elaborate on both the educational setting and the theoretical background of these studies, since they both influence the value of the results and how the results should be interpreted. Furthermore, we compare the methods that were applied.

1.7.1 Educational setting

Most studies on writing-from-sources tasks were conducted in educational settings. In the writing-from-sources studies, three purposes were paramount:

- *Writing-from-sources as pedagogical approach*
  In a number of studies, writing-from-sources is seen as a pedagogical approach that encourages students to read and study the sources carefully, reflect on them, and

construct meaning from the sources by relating the acquired knowledge to their prior knowledge. The students write a text, which is not primarily a goal in itself, but a means to enhance deeper and better learning from the sources. Research on writing-from-sources with these purposes seeks to improve the pedagogical practice of writing-from-sources tasks.

- *Improvement of writing skills*
  In other studies on writing-from-sources, the focus is on the improvement of students' writing skills. Instead of relying on imagination or their (limited) knowledge of a topic, students are encouraged to use sources in their generation of content and structure for a paper or an essay. From this perspective, the sources are the input for the writing process. The challenge for the student is to bring together information, viewpoints and arguments from different sources and write a coherent essay that, in terms of Bereiter & Scardamalia (1987), does not merely tell the knowledge, but also transforms the knowledge, which includes taking a stance and using information to state an argument.

- *Preparation for professional life*
  The third purpose of writing-from-sources assignments is related to acquiring the skills for this task in preparation for an academic or professional career. Teachers want to teach their students how to write in the disciplines (Kennedy, 1985). To prepare students for their work after graduation, students should familiarize themselves with the common genres in their own discipline, both passively (by reading) and actively (by writing). Teachers may provide writing-from-sources assignments to their students with this purpose in mind.

Perin et al. (2003) summarized these three purposes: providing writing-from-sources assignments facilitates both academic learning and workplace competence. But these educational purposes do not cover the full scope of writing-from-sources tasks. Writing-from-sources is also common in academia and professional practice. Unfortunately, empirical research in these areas is also limited. Although interesting studies on professional reading practices do exist (e.g. Neutelings, 2001; Wineburg, 1998), they do not address how professionals actually follow up their reading, which is likely to be writing a new text.

The number of studies on professional writing-from-sources is illustrative for the attention that has been paid to professional writing-from-sources. We found only two truly professional writing-from-sources studies that were carried out within a non-educational setting: O'Hara et al. (2002), and Melenhorst et al. (2005)[1]. In the vast majority of 20 studies, college students were employed as subjects.

Although our attention is not focused on an educational setting, the studies can inform us about the factors and processes that affect the process and product of writing-from-sources. The purposes of writing-from-sources studies should be kept in mind when generalizing the results of these studies to a professional setting.

1.7.2 Methodological approaches

Two dominant approaches were found for investigating writing-from-sources: proto-col analysis and a text-analytical approach. In *protocol analysis*, participants think, read and compose aloud by verbalizing everything that comes into their mind. This approach can shed light on

[1] This article describes the pilot study, which is included in Chapter 2 in adapted form.

the process of writing-from-sources. Studies that follow this approach focus on the cognitive activities that writers carry out during reading, note-taking, or composing. Breetvelt et al. (1994, p. 109) define cognitive activities as the thinking process that is verbalized and registered during the performance of the writing assignment.

Eleven studies in our sample used protocol analysis. The method can provide useful insights into the cognitive activities writers carry out during their writing-from-sources tasks. Although it is impossible to obtain a completely reliable transcript of the cognitive activities that writers engage in, according to Ericsson & Simon (1984) the think-aloud method is a reliable method for assessing cognitive processes of a verbal nature. These verbal tasks include writing-from-sources.

Even though the method can provide useful insights, the method in itself is subject to discussion. The main problem with protocol analysis in the studies is that the studies often quantify the results of a qualitative method that is designed to investigate cognitive processes. Although these results are informative in terms of the distribution of these activities over time or across participants, they do not encapsulate the richness of the writing-from-sources process. Therefore, a combined qualitative and quantitative analysis of the protocols (such as McGinley, 1992) seems to be required to do justice to the richness and complex nature of the process.

In the second approach, a *text-analytical approach*, the written outcomes of the process are analysed. These outcomes include not only the final piece of writing, but also notes, draft versions, and notes on the source documents. Twenty-four studies in our sample took this approach. Various textual measures were created as operationali-sations of the research questions, such as the number of connectives (Voss & Wiley, 1997), or the organisation of the essay (Risemberg, 1996).

1.7.3 Experimental Tasks

We also found differences in the tasks that participants were required to carry out in terms of the requested writing product. Requested writing products include explanatory essays (Campbell, 1990), argumentative essays (Breetvelt et al., 1994), informational reports (Perin, 2003), or comparison/contrast essays (Risemberg, 1996). The assignments were unspecific about the precise criteria the essay should meet.

Consequently, the skills required to perform these tasks may differ. For instance, writing an argumentative essay requires readers to take their own stance, while an informational essay is much more factual. Taking one's own stance requires the ability to reflect on the information in the sources, while summarizing and restructuring the information is more important for an informational essay.

In the design of most of the studies, only the task description is manipulated. This is logical, since the focus of most studies is to provide teachers with empirically supported advice on the teaching of writing-from-sources. However, the precise effect of students possessing or lacking certain rhetorical skills on the final essay is not addressed. When a distinction is made in the design between different levels of expertise, only very general measures are employed to distinguish between competent and less competent writers. The effect of task manipulations on the essays that were found in the studies is then mediated by the specific rhetorical skills writers have, which are not reflected in general distinctions such as between competent and

less competent writers. This mediating effect demands a careful interpretation of the results regarding the effect of task manipulation of the final essays.

1.7.4 Sources Used in the Studies

Different sources and different types of sources are provided to the participants. The studies differed both in the nature and in the number of sources they provided to their participants. The provided sources depended on who the participants were. For young children, two or three easy passages on everyday-life topics were provided. In contrast, to investigate the writing-from-sources process with undergraduate students, researchers provided their participants with college-level text books, complex reports, historical interpretations, and analyses (e.g. Greene, 1993; Rouet et al., 1996; Voss & Wiley, 1997). Campbell (1990) and Mathison (1996) provided their participants with a single source. For both college students and younger students, the number of available sources is quite limited. As an exception, Many et al. (1996) allowed their students to retrieve their own sources from the library.

The sources are in most cases provided to the students, which in fact omits the selection process that is characteristic for professional tasks from the analysis. Little is known about how writers deal with *large* information spaces in a writing-from-sources task.

1.7.5 Measurement of Text Quality

The frequency with which the ultimate effect on the quality of the resulting final text is investigated in the studies is surprisingly low. If the studies had addressed text quality, different approaches could be followed. The approaches the studies followed to assess text quality are shown in Table 1.1. In the third column, exemplary studies are mentioned.

Table 1.1
Types of quality measurement

Type of judgement	Unit of analysis	Examples of studies
No quality judgement		McGinley (1992), Langer (1986), and Kennedy (1985).
Textual measures	Argument, T-unit	Stapleton (2001), Tierney et al. (1990), Voss & Wiley (1997)
Holistic judgement – Scale points	Essay	Breetvelt et al. (1996), Campbell (1990)
Holistic judgement – Rankings	Essay	Melenhorst et al. (2005)

In some studies, an explicit choice is made to focus on process characteristics without considering their effects. These studies provide a rich description of the process, primarily based on think-aloud protocols, but they do not address the effectiveness of the distinguished cognitive operations.

When textual measures are used to assess composition quality, they are distilled from the final essays, such as the number of different types of arguments (for instance, Stapleton, 2001). These measures are used to assess the extent to which students have learnt from reading the

texts. Learning is derived from measures such as recall (e.g. Newell & Winograd, 1995), accuracy of the content incorporated in the essay (e.g. Perin, 2003), or connections between parts of the sources the students have studied (e.g. Voss & Wiley, 1997).
When the focus is not on learning but on the rhetorical moves that writers undertake, textual measures can reflect the rhetorical transformations they apply on the information they use from the sources. Examples include Greene (1993), Lewkovicz (1994), and McCarthy Young & Leinhardt (1998).

As an alternative for textual measures, researchers can ask independent raters to evaluate the quality of the compositions as a whole. The relative or absolute holistic quality scores can be indicators of general composition quality as perceived by the readers of the writing product. As such, the scores are an evaluation of whether the text fulfills its function.

In this case raters assign a value on one or more dimensions to the participants' compositions. Relatively few researchers have followed this approach. In most of these studies an absolute value is assigned to the compositions (Breetvelt et al., 1994; Mathison, 1996; Spivey & King, 1989; Campbell, 1990). Another possibility is to ask raters to order the compositions *relative* to each other on one or more dimensions (e.g. Melenhorst et al., 2005).

The challenge of both rating approaches is to reach agreement between the independent raters. This is an issue that has received much attention within the context of essay assessment in high school and elementary school (De Glopper, 1985; Meuffels, 1985). De Glopper (1985) and Meuffels (1985) have shown that agreement between raters is hard to achieve and that the judgements are subject to various validity threats, including the halo effect, order effects, and so on. These threats make it difficult to derive relationships between measures of the writing-from-sources process and 'quality'.

The methods that are available for judging text quality all originate from an educational setting. Developing a method that is able to measure text quality in a professional setting would contribute to our understanding of different approaches to writing-from-sources tasks in relation to text quality.

1.8 Recursive Nature of the Writing-from-Sources Process

The writing-from-sources studies show that readers do not perform the same activities throughout the entire writing-from-sources process. Reading, note-taking, and writing cannot be conceived as three separate phases of the writing-from-sources process. This is consistent with Flower & Hayes's (1981) model of the *writing* process, which highlights the recursive nature of writing. Recursivity is then not only characteristic for composing in isolation, but also for the writing-from-sources process as a whole.

In observing undergraduate college students, McGinley (1992) found that activities related to reading dominated in earlier phases, while writing activities dominated in the final phases of the process. Langer (1986) not only observed differences between reading and writing, but also in the patterns of cognitive activities the participants engaged in during these subprocesses. Based on her analysis of verbal protocols, she found that elementary and high school students focused on the ideas for content in later phases, while in earlier phases questioning and hypothesizing dominated the protocols. In reading, they focused on gaining support for their interpretations, and in writing they focused on the strategies they used to create their meanings (p. 235). Thus, writers perform different cognitive activities in the various phases of writing-from-sources.

Although the studies show that the cognitive activities depend on the phase of the process which the author is in, these patterns of activities do not suggest a separation between the

reading and writing processes. Analyses of the distribution of cognitive activities over different phases of the process should be interpreted with caution as any division in phases would seem to be artificial: in writing-from-sources tasks, readers frequently shift from reading to writing (O'Hara et al, 2002). Spivey (1997, p. 145) argues that "when reading a text is a part of composing another text, it is impossible, I maintain, to differentiate the reading process from the composition process because meaning is being constructed from one text for another text". Consistent with this notion, McGinley (1992) concludes that reading and writing are recursively integrated throughout the process based on his analysis of cognitive activities in the different phases of the process. In other words, he also rejects a linear perspective on the writing-from-sources process.

Although cognitive activities can hardly be tied to a process phase, the effect they have on the quality of the compositions seems to be dependent on the moment at which they are performed during the process. Breetvelt et al. (1994) found that this pattern of effects is complex. Cognitive activities that have a positive influence on the quality of the composition in one phase may have a negative influence on composition quality in other phases of the process. In the initial phase of the process, reading the assignment, and evaluating the text or evaluating what has been written had a positive influence, whereas goal-setting, structuring ideas and composition, and revising composition had a negative influence. In the later phases of the process, goal-setting and structuring had a positive influence, whereas reading the assignment and evaluating and revising text has a negative influence. In the final phase, a positive influence was found from self-instruction, goal-setting, writing, and re-reading.

Elaboration of the Writing-from-Sources Framework

We can conclude that the results from the writing-from-sources studies with respect to the recursive nature of the process are consistent with the tentative writing-from-sources framework. The cognitive activities – with respect to which differences were found between the subprocesses – are located within the monitor component. The monitor controls the planning, monitoring, and evaluation of the information that is read from the sources, as well as the evaluation of the text that has been written so far. The recursive nature of the process is depicted by the mutual relationships between the components of the framework. However, the relationship between cognitive activities and composition quality is not yet part of our writing-from-sources framework.

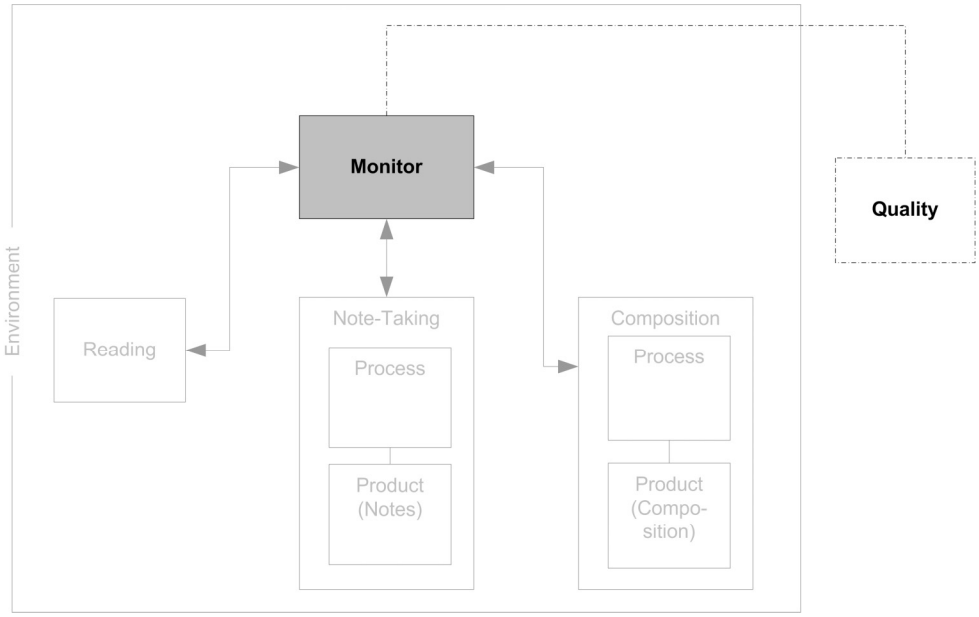
The framework was elaborated by adding the following elements to the framework, summarized in Table 1.2.

Table 1.2
Elaborations of the Writing-from-Sources Framework: Recursive Nature of Writing-from-Sources

Framework elaboration	Foundation
Quality of the compositions as an outcome variable related to the monitor	Breetvelt et al. (1994)

The elaborated framework is depicted in Figure 1.5. The parts that were added are emphasized.

Figure 1.5. Writing-from-sources Framework with Quality as Outcome Variable



Note.. Analytical relationships, that is relationships that are drawn to point out factors that describe differences between individuals or between writing-from-sources products, but are not a relationship in the writing-from-sources process itself, are indicated by means of a – . – line. Outcome variables, that is, measures that describe a resultant of the process or product of writing-from-sources, are marked with a box with a – . – border.

In this section it has already been argued that the way in which writers deal with the task early in the process influences the quality of the compositions.
Reading the task description is only one step in the process of constructing a task representation, which is the result of a logical analysis of the writing problem. A number of studies have focused attention on this process. The influence of the task representation is addressed in the next section, Section 1.9.

1.9 Monitor and Task Representation

As shown in the description of the studies in Section 2.2, in writing-from-sources research a variety of tasks is given to the students. Differences in the task provided are likely to affect the characteristics of both the process and the product of writing-from-sources.

We examined the writing-from-sources studies to assess the influence of the task provided on the process and product of writing-from-sources with the purpose of elaborating our writing-from-sources framework. The findings are summarized in Table 1.3.

Table 1.3
Effect of the Task on Process and Product of Writing-from-Sources

Study	Task	Effect on process	Effect on product
Spivey & King (1989)	Informational report	If students found content in multiple sources, they included it in their reports	Writers listed content in their reports
Durst (1989)	Summary vs. analytical essay	Summary writing elicits less monitoring and reflecting on subject matter than writing an analytical essay	
Voss & Wiley (1997)	Essay vs. narrative or history		Students transform infor-mation more often when asked for an argument-tative essay than students asked for a narrative or a history
Stahl et al. (1996)	Descriptive essay vs. opinion essay		Information in descriptive essays kept closer to the sources; opinion essays included more global statements. Students composing descriptive essays kept closer to sources. Students writing opinion essays included more global statements not related to single elements in the sources.
Greene (1993)	Problem-based essay vs. report	Students requested to write a problem-based essay thought it was required to use both the source materials and their own ideas, whereas other students requested to write a report primarily relied on source materials.	
Wiley & Voss (1999)	Argumentative essays vs. narratives, summaries or histories		In argumentative essays, students incorporated more causal connections than in narratives, summaries or histories

Table 1.3 suggests that tasks that require an argumentative text (analytical essay, opinion essay, problem-based essay) lead to a different use of sources than tasks that require an informational text (summary, narrative, history, descriptive essay, report). Argumentative tasks seem to result in more transformations of content, a more integrative approach, and more 'own' elements in the text.

Writers' approach to the task influences not only the product, but also the process of writing-from-sources. When students start a task, they first read the task description. As Breetvelt et al. (1994) stress: "reading the assignment in the beginning serves the internalization of the writing assignment" (p. 119). They take the goals and the constraints of the 'writing problem' into account, from which they identify the issues that need to be addressed (Yang, 2002, p. 43). Flower (1990) refers to the outcome of this analysis of the writing problem as 'task representation'. This notion of a task representation has its origin in research on the writing process (Flower & Hayes, 1981, see Section 1.2.2).

Writers refine their initial task representation throughout the process as a result of both reading new information and of composing in itself (McGinley, 1992). According to Langer (1986), who investigated elementary school and high school students, writers refine their task representation by formulating questions and hypotheses about the task. Even though her students were relatively inexperienced, they were able to actively construct and refine their task representation.

In sum, constructing a task representation is an active process. The task and the representation that writers construct from the task have a substantial impact on both the process and the composition that is the result of the writing-from-sources process.

The effect of spending effort on constructing a task representation has been investigated by Breetvelt et al. (1994). She analysed the relationship between cognitive activities and text quality among high school students who were requested to write argumentative essays. The quality of the essays proved to increase when writers spent effort on reading the assignment in the first phase of the process (Breetvelt et al, 1994).
But to what degree do readers actually spend effort on constructing a task representation? Based on verbal protocols, Durst (1989) found that high school students paid considerable attention to figuring out the demands of the task. In contrast, McGinley's (1992) participants spent little effort (as measured by protocol fragments) on reading the task description, even though the task description is relatively specific about the requested content of the essay and about the reader that has to be addressed. One would expect that envisioning that task and its demands took more effort than the readers spent on it. Thus, even though these studies are hard to compare, the results seem to be inconsistent. Differences in reading materials or topic knowledge of the students may account for these contradictory results.

To what degree the task representations vary between individuals depends on various factors, including prior knowledge (Yang & Shi, 2003), the level of specificity of the task (Yang & Shi, 2003; Greene, 1993), and the provided sources (Penrose, 1992). These factors manifest themselves in the degree to which planning occurs, information is selected, and how sources are evaluated. From variations in these factors, Nelson & Hayes (1988) derived two extreme approaches to the writing-from-sources task that are based on a qualitative analysis of undergraduate students engaged in an analytical writing task: a content-driven approach and an issue-driven approach. These two approaches are summarized in Table 1.4.

Table 1.4
Differences between Content-Driven and Issue-Driven Approaches after Nelson & Hayes (1988)

Aspect of approach	Content-driven	Issue-driven
Planning	Start working immediately	Planning and goals basis for decisions throughout the process
Role of prior knowledge	Minimal	Basis for planning as well as information needs
Role of sources	Collecting information from limited number of comprehensive sources	Filling gaps in knowledge, resulting from a well-planned search process
Evaluation of information	Based on easy retrieval of information	Based on content

Writers who take a content-driven approach reduce the writing-from-sources problem to a content collection problem, whereas writers who take an issue-driven approach engage in a goal-directed problem-solving process. These two approaches overlap the knowledge-telling and knowledge-transforming models of the (isolated) *composition* process to a large extent.

Although they are strictly separated in the table, the approaches must be considered as a continuum rather than a dichotomy: Most writers – in Nelson & Hayes (1988) undergraduate college students – will combine a content-driven approach to writing-from-sources process with an issue-driven one. Nevertheless, by studying both approaches it becomes clear that the task representation has a significant impact on the writing-from-sources process. The task representation has an impact on the role that the sources play, how information is evaluated, and on planning.

Elaboration of the Writing-from-Sources Framework

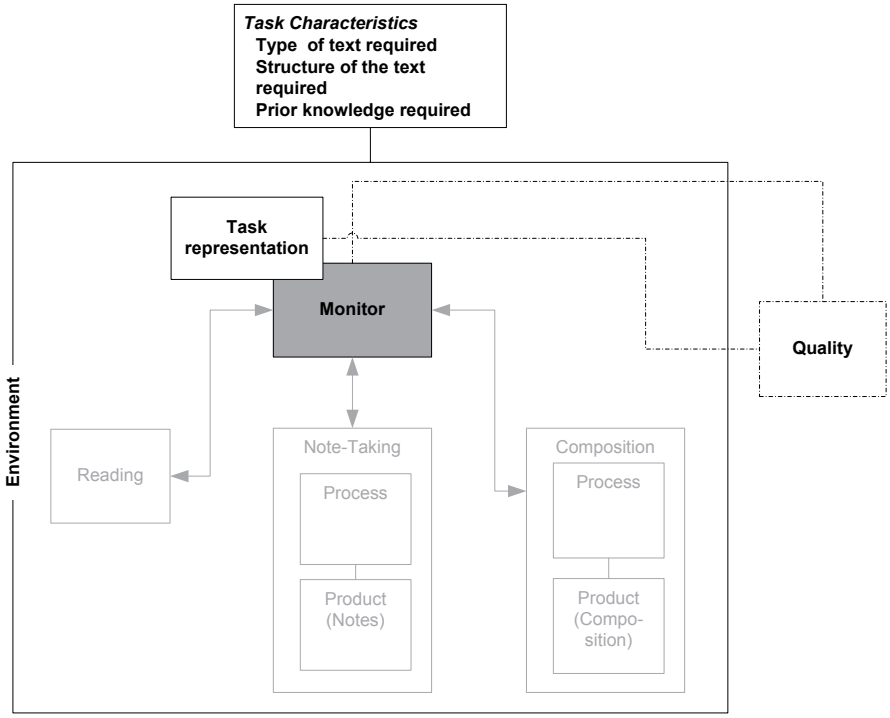
In this section we have addressed the role of the task and the task representation in the process of writing-from-sources. Based on this discussion we can elaborate our writing-from-sources framework. The elaborations are displayed in Table 1.5.

Table 1.5
Elaboration of the Writing-from-Sources Framework: Monitor and Task Representation

Framework elaboration	Source
Task representation as subcomponent of the 'Monitor' unit	Langer (1986), Nelson & Hayes, (1988) McGinley (1992), Yang (2002), Breetvelt et al. (1994)
Task characteristics as factor affecting the writing-from-sources process as a whole (that is, each subprocess)	Studies summarized in Table 1.2, Yang & Shi (2003)
Relationship between task representation and composition quality	Breetvelt et al. (1994)

The elaborated framework is displayed in Figure 1.6.

Figure 1.6 Writing-from-sources Framework with Task Representation Included



1.10 Reading and Evaluating sources

Reading and evaluating the sources is a prerequisite for being able to write a meaningful text. The extent to which writers do so depends in part on writers' prior knowledge. How readers use the sources has been investigated in several studies. Below we list and describe the factors that affect how the sources are evaluated and used for the final compositions. These factors will then be incorporated into the writing-from-sources framework.

Functions of idea generation and collection of evidence

In general, the sources were found to serve two functions: a) to help writers generate additional ideas (Lewkowicz, 1994; McGinley, 1992; O'Hara et al., 2002; Stapleton, 2001), and b) to collect information as evidence (Stahl et al., 1996; Mathison, 1996; Greene, 1993). Thus, reading the sources not only results in information that can be used as arguments for the eventual text, but also in new ideas. Writers not only get their ideas from the sources, but also generate new ideas by integrating the information read with their prior knowledge.

Knowledge-Telling and Knowledge-Transforming

The use of sources can best be understood in terms of Bereiter & Scardamalia's (1987) model of the writing process (see Section 1.2.2). Based on an analysis of children's writing process, they argue that expertise in writing develops along the continuum between knowledge-telling and knowledge-transforming. Novice writers tell know-ledge, whereas more experienced writers transform knowledge.

Bereiter & Scardamalia's (1987) model of the composition process is also presented as the framework by means of which the use of information from the sources is charac-terized in writing-from-sources tasks. Within this context indications of knowledge-telling include making extensive use of citations with little or no modification (Kennedy, 1985), and writing summaries of a text rather than using the source texts as evidence for a certain claim. In an educational setting, providing a summarization task seems to induce knowledge-telling. When students write summaries, they tend to write texts that are less evaluatory. They are reproducing the information from the sources (Mathison, 1996).

Reproducing knowledge can result in a rhetorically powerful text when information is represented accurately and information is adapted to the context of the new text. However, Lewkowicz (1994) found that students were unable to represent knowledge from the sources in such a way. She observed an "inclination to select key words from the texts and, often out of context, string them together without any development or explanation, making their points at times difficult to follow" (p. 213). Thus, her students reproduce information from the source texts by using the original formulations without placing the used phrases in the context of the text to be written. As Stahl et al. (1996) found, students also tended to keep the information from the sources in the same order.

Greene's (1993, p. 68) analysis of undergraduate students composing a report or a problem-based essay found that students strategically place information in the texts they write and use points of information presented in the source texts to support a claim in order to fulfil their goals as writers. Such an approach is characteristic for a knowledge-transforming approach to writing-from-sources. Writers who take such an approach compose texts that are more coherent, better structured, and better adapted to the readers' needs (Bereiter & Scardamalia, 1984).

Effects on Advice Quality

The writing-from-sources studies provide evidence for a relationship between writing quality on the one hand and the functions for which the writers use the sources on the other, as well as between writing quality and how writers use the information from the sources.

Mathison (1996) found that if writers collect evidence for their compositions rather than rely on what they already know, the quality of their writing improves. However, Mathison (1996) employed undergraduate students in his research. When more experienced writers with more domain knowledge are involved, it could be that the quality of the writers' compositions will not necessarily increase when they use the sources rather than their own knowledge.

The way in which writers use the information from the sources also affects writing quality. Integrating information from sources rather than list information was found to contribute positively to the quality of the final text (Mathison, 1996). In terms of Bereiter & Scarademelia (1987), knowledge-transforming results in better final texts than knowledge-telling.

Thus, a relationship was found between writing quality and the functions for which the sources were used, and between writing quality and the use of information from the sources.

Influence of the Task on the Use of Sources

In analysing the decisions concerning whether to use specific information from sources or not, two factors have been investigated: the specific task the readers have to carry out and the characteristics of the sources. Greene (1993) demonstrated that when college students were given the instructions to write a report, they wrote essays that reproduced more information from the sources than when they were instructed to write problem-based essays. In contrast, participants added more of their own interpretations to the essays when they were instructed to write problem-based essays. Their verbal protocols revealed that assumptions about the discourse type (report or problem-based essay) were responsible for this result.

Thus, the task influences the manner in which the sources are used through the assumptions the writers make about the genre of the text to be composed.

Source Characteristics

The characteristics of the sources as well as the writers' estimation of the usefulness of these sources form the second factor to affect document use. McCarthy Young & Leinhardt (1998) have shown that students primarily cited from textual documents that express an opinion, such as letters, editorials, and speeches, while highly complex information tended to be ignored. In Stahl et al. (1996) students tended to select information from short and well-structured texts, used the information for their notes and subsequently for their essays. Thus, discourse type, and document length and structure affect the extent to which information from a source is used.

In the context of history education, the issue of document selection, evaluation, and use is of great importance. It was found that trustworthiness is an important factor that affects the use of documents. In Rouet et al. (1996) undergraduate students evaluated the trustworthiness of the sources on three levels:

- *Author of the source*
  The author proved to be an important factor by means of which students explained their evaluations of a source's trustworthiness.

- *Discourse type*
  On the level of discourse type, it was found that some discourse types (original historical sources, textbook passages) received higher trustworthy-ness rankings than others (such as 'eyewitness' reports). In the final essays students tended to refer to all types of documents to substantiate their arguments, but most frequently to primary documents ('original' historical sources).

- *Document features*
  On the level of document features, the author and the content were the factors that influenced the trustworthiness most.

When writers evaluate sources critically they do not only evaluate their content. The perception of the status of the source's author influences how the sources are evaluated: due to a perceived status difference, students were hesitant in taking a critical stance towards sources written by scholars (Mathison, 1996). In other words, the reason that the claims of these scholars were used was not because they were considered true, but because the source's author was held in high esteem.

In conclusion, source characteristics and trustworthiness are important factors that influence the evaluation and use of source documents.

Influence of Instruction

Not surprisingly, students need to be taught how to transform knowledge. In general, when students learn how to approach a writing-from-sources task, they gradually move away from telling knowledge to transforming knowledge as a result of explicit instruction and increased experience. Segev-Miller (2004) analysed the compositions of 24 teachers enrolled in a Master's programme. She analysed their compositions both at the beginning and at the end of a course on "reading and writing to learn". While at the beginning a lack of focus, a replication of the source text's rhetorical structure, and verbatim use of information from the source was found, at the end of the course the participants started to make conceptual transformations and adopt a more suitable rhetorical structure. In a similar manner, McCarthy Young & Leinhardt (1998) found that students demonstrated progress from presenting ideas in sequence to linking them conceptually. Furthermore they qualified rather than presented the information.

Thus, experience and instruction can help students to acquire the skills required to successfully complete a writing-from-sources task. This positive effect of instruction was also observed with young children by Chambliss et al. (2003). Their fourth grade students relied heavily on the sources, but by instructing them to take notes in a systematic manner, they were able to use these notes to reformulate and reorganize text content in their own words.

Kennedy (1985, p. 451) summarized the differences between fluent and not so fluent participants with respect to their reading activities: "[the] truly fluent group read the text with pencil-in-hand, overtly employing many spontaneous learning activities like underlining and providing comments that revealed they were interacting with the writers in a deliberate way. Conversely, the not-so-fluent group were passive processors who read the texts with hands tied behind their backs, rarely using study-type strategies or acting upon the texts in an assertive way".

Prior Knowledge

Prior knowledge was found to affect the evaluation of information from the sources, affecting both the selection process and the evaluation process. According to McCarthy Young & Leinhardt (1998), topic knowledge helps students to retrieve information. Students were able to concentrate on relevant information, and ignore irrelevant information (Stahl et al., 1996). They were able to retrieve information from documents regardless of document type or the documents' specific features.

The evaluation process is also affected by prior knowledge. When a source is read that is familiar to the reader, it elicits more critical thinking than when an unfamiliar text is provided to the participants. Prior knowledge thus enables the reader to take a critical stance towards the text rather than to process the text passively (Stapleton, 2001). A more critical stance towards the sources influences the manner in which the sources are used to substantiate the final text.

Thus, prior knowledge proved to affect the evaluation of sources. This proved to be not only the case with isolated reading by professionals (as shown in Section 1.2.1), but also within a writing-from-sources context.

Elaborations of the Writing-from-Sources Framework

To summarize the evaluation of sources, the way in which students use the source documents depends on who was talking, how they were talking, and what they were talking about (McCarthy Young & Leinhardt, 1998, p. 52-53). Experience and instruct-tion were found to strongly affect the manner in which writers use sources to substan-tiate their compositions.

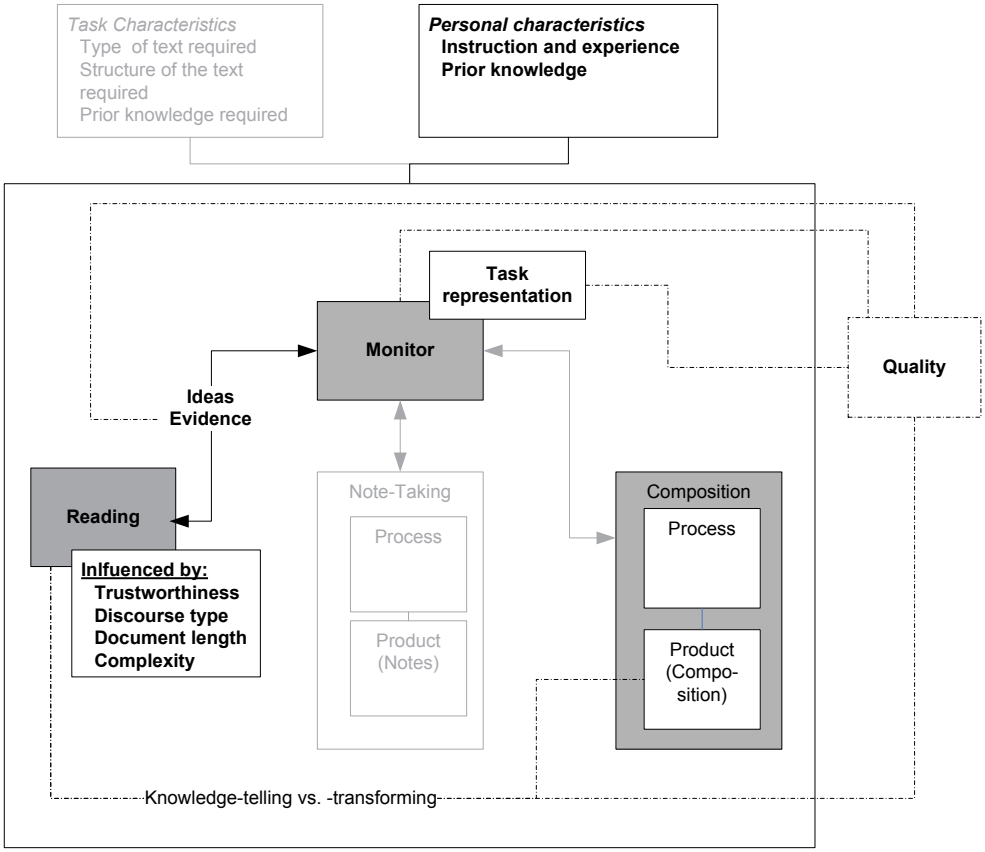
The elaborations of the writing-from-sources framework that result from the analysis in this section are listed in Table 1.6.

Table 1.6
Elaboration of the Writing-from-Sources Framework: Reading

Framework elaboration	Foundation
Relationship between Reading and Monitor: functions of the sources:	
• Idea generation	Lewkowicz (1994), McGinley(1992), O'Hara et al. (2002), Stapleton (2001)
• Collection of evidence	Stahl et al. (1996), Mathison (1996), Greene (1993)
Relationship labelled 'Knowledge-telling vs. knowledge-transforming' between 'Reading', and 'Composition'	Kennedy (1985), Mathison (1996), Lewkowicz (1994), Stahl et al. (1996), Bereiter & Scardamalia (1984)
Relationship labelled 'Knowledge-telling vs. knowledge-transforming' between 'Reading' and Quality	Mathison (1996)
Relationship between the function of collecting evidence and writing quality	Mathison (1996)
Factors that influence the use of the sources (trustwor-thiness, discourse type, document length, and complex-ity) as subcomponent of 'Reading'	McCarthy Young & Leinhardt (1998), Stahl et al. (1996), Rouet (1996)
Add 'Instruction & experience' as a factor that influences the writing-from-sources process as a whole	McCarthy Young & Leinhardt (1998), Segev-Miller (2004), Chambliss et al. (2003)
Add 'Prior knowledge' as a factor that affects the writing-from-sources process as a whole	McCarthy Young & Leinhardt (1998), Stahl et al. (1996)

The new framework is depicted in Figure 1.7.

Figure 1.7 Writing-from-sources framework with Reading included



1.11 Note-Taking

1.11.1 Note-Taking during Writing-from-Sources on Paper

Most studies do not mention the act of taking notes. The role of note-taking can be conceptualised as an intermediate step from the information in the sources to the final text. Hence, note-taking is positioned in between reading and composing in the framework. In this section we address the purposes, outcomes, and activities of taking notes.

Purposes

Note-taking serves various purposes both for the process and the product of writing-from-sources, the composition. In Section 1.3 we identified the potential benefits of note-taking. The notes may serve an encoding function, or an external storage function.

The Distributed Cognition framework, introduced in Section 1.3, claims that the people seek to offload cognitive effort to external artefacts whenever possible. O'Hara et al. (2002) have applied this framework to the writing-from-sources process.

They conclude that taking notes during writing-from-sources helps authors to reduce the cognitive load of the task. Writers proved to offload cognitive effort by enriching their sources with highly personal notes.

These notes could only be interpreted by the writers themselves. These enrichments serve various purposes:

- *Activating prior knowledge*
  The enrichments served as pointers to the author's knowledge. Both by writing or by re-reading the notes, writers *activate their prior knowledge*.

- *Facilitating re-reading*
  By adding various textual markings, the professionals made it easier to reread the information. The markings helped to "reduce the perceptual complexity of the source material by making relevant points more salient against the backdrop of less important material on the page." (O'Hara et al., 2002, p. 290). These textual markings *facilitate re-reading* to reconstruct earlier cognitive states.

- *Linking (fragments of) sources to each other*
  Linking sources by means of notes is a cognitively efficient way of combining information from multiple locations. In terms of Distributed Cognition (Hutchins, 1995a), the notes are external artefacts that allow the author to offload the cognitive effort of keeping all the connections between the sources continuously in mind.

Thus, through reading the sources and making notes on them, the author can combine information from various locations and can relate what he has read to his prior knowledge. This will reduce the cognitive load of the task

Based on the observation of college students' note-taking, McGinley (1992) argued that taking notes helped students to construct new meaning from the sources, to generate ideas, and to develop arguments for the final text. Constructed meaning, ideas, and arguments are perceived as the results of the note-taking process.

Note-Taking Activities and their Importance across the Writing-from-Sources Process

When readers take notes, they can carry out various activities. They may copy citations, write down their ideas for the compositions, paraphrase what they have read in the sources, and so on. Writing-from-sources studies show that the number of each of these note-taking activities depends on the phase in the reading and composition process, the number of source documents the writers have read previously, their motivation, and their skills.

With respect to the process phase, McGinley (1992) has shown that note-taking diminishes over time. It occurs most often at the beginning of the process, and drops in later phases. Stahl et al. (1996) found similar results. They concluded that the frequency with which readers take notes depends on how many documents were read. Readers tended to take notes more often on the first documents they read than on documents they read later on. In addition, they observed that argumentative passages in short documents are most likely to elicit note-taking.

The activities readers perform depend not only on what they can do, but also on their motivation. In Nelson & Hayes (1989) writers tended to condense note-taking and composing into essentially one act, when seeking to maximize efficiency. They took detailed notes with the purpose of using them in the paper based on their judgment of the relevance of information in the sources. In contrast, writers who were willing to spend substantial effort on the task, took

notes to stimulate their thoughts. The notes were the result of a plan and were organized systematically. The notes rather than the sources formed the basis for the final composition. Note-taking proved to be related to composition skills. Kennedy (1985) shed light on the differences in note-taking between competent and less competent writers. Competent writers read actively with a pencil in their hand to make notes, thus interacting with the author consciously. They set aside the sources and worked from their notes to their essay rather than using source materials directly for the final text. They exercised restraint with respect to copying passages from documents verbatim to the notes and to the final text.

According to Kennedy (1985), less competent writers were more passive processors of text. They copied citations from the documents to their notes much more frequently. Kennedy (1985) concluded that less competent readers copied only direct quotations to their notes during reading, while they drew heavily on the sources during composing, extracting and incorporating citations during that process. The effect of this strategy is open to question, as copying passages from documents verbatim was found to affect essay quality negatively (Melenhorst et al., 2005). Slotte & Lonka (1999), who observed undergraduate student composition based on a single source, also found that verbatim copying affected learning performance negatively.

Even though copying citations seems to have a negative influence on performance, it occurs frequently during writing-from-sources tasks. In fact, all note-taking activities proved to help writers to formulate a substantiated essay that integrates information from the various sources.

1.11.2 Note-Taking during Writing-from-sources on Screen

Taking notes not only occurs when writing-from-sources tasks are carried out on paper. Taking notes is also possible on screen. But little research has been conducted on writing-from-sources in an on-screen environment. The ease with which writers can take notes on paper is offered as one of the arguments against the prophecy that paper will disappear from the office environment: "whereas paper is lightweight, inexpensive and easy to annotate, interfaces for online reading typically involve clumsy interactions with bulky desktop monitors" (Schilit et al., 1998, p. 249).

The available research is most often concerned with the technical development or the usability aspects of notes on screen with the purpose of emulating the manner in which readers take notes on paper. For instance, Olsen et al. (2004) developed a system called ScreenCrayons allowing writers to take and organize notes of all kinds – underlinings, highlights, jottings, and so on. But no attempt is made at evaluating its usefulness and usability in real-life tasks.

Although this technical research is worthwhile in helping to resolve the disadvantages of screens compared to paper, the merits of this type of research do not increase our understanding of the process of on screen note-taking in real-life tasks such as writing-from-sources. Nevertheless, it informs us about which note-taking activities writers can engage in when they take notes on screen.

One example of a system that extends its focus beyond technical and usability aspects is XLibris. XLibris has been developed by FXPal. FXPal's research does not only addresses the technical and usability aspects (Schilit et al., 1998; Golovchinsky & Marshall, 2000), but also its potential applications for real-life tasks, such as legal research (Marshall et al., 2001) and collaborative use of a digital library (Marshall et al., 1999). XLibris runs on either a separate reading device (Marshall et al., 1999) or a Tablet PC (a notebook screen that can be operated without a keyboard by using a stylus; Marshall et al., 2001). It features thumbnail views of

pages for easy navigation, various types of notes (including highlighting, underlining, circling, and marginalia), an overview of the notes, and the opportunity to include references to other relevant documents automatically based on the text that surrounds the note.

Surprisingly, Marshall et al. (1999) found that writers easily forgot the meaning of their note. She compared reading and taking notes on paper with reading and taking notes using XLibris. They tentatively concluded that notes "are part of an unselfconscious engagement with the text rather than the result of a fully formed interpretation of the material" (p. 81). No differences were found between notes on paper and notes on screen. Both groups took the same type of notes on the sources and spent little effort reviewing their notes. The latter is surprising since the electronic notebook was far more advanced. It features an automatic collection of notes which was hypothesized to make reviewing easier. However, interface problems made it impossible for the readers to use this feature effectively.

Although this system sounds promising from a technical point of view, when writers want to use this system for their writing-from-sources tasks, they are forced to use a separate and relatively expensive device. O'Hara et al. (2002), who observed twelve professionals during their writing-from-sources tasks in a field study, found that using multiple displays (being paper and screen combined) resulted in higher cognitive demands. Thus, even though systems like XLibris appear to yield a significant advancement regarding on-screen note-taking, its feasibility is questionable in terms of required resources and in terms of the imposed cognitive load.

Based on the discussion of note-taking in writing-from-sources – both on screen and on paper – we can elaborate our writing-from-sources framework, as shown in Table 1.7.

Table 1.7
Elaborations of the Writing-from-Sources Framework: Note-Taking

Framework elaboration	Foundation
Add relationship between Monitor and Note-taking with the purposes as descriptors: activating prior knowledge, facilitating re-reading, and linking sources	O'Hara et al. (2002),
Add relationship between Note-taking and the outcomes of note-taking as descriptors: constructed meaning, ideas, and arguments	McGinley (1992)
Add Organization and Formulation as subcomponent to the product of note-taking	Kennedy (1985), Slotte & Lonka (1999), Melenhorst et al. (2005),
Add Copying citations to Activities as subcomponent to the process of note-taking	Kennedy (1985), Slotte & Lonka (1999), Melenhorst et al. (2005)
Add Highlighting to Activities as subcomponent to the process of note-taking	*Research on on-screen note-taking:* Olsen et al. (2004)
Add relationship between Note-Taking and Quality	Melenhorst et al. (2005)
Add Cognitive load and the relation to Note-Taking	O'Hara et al. (2002)

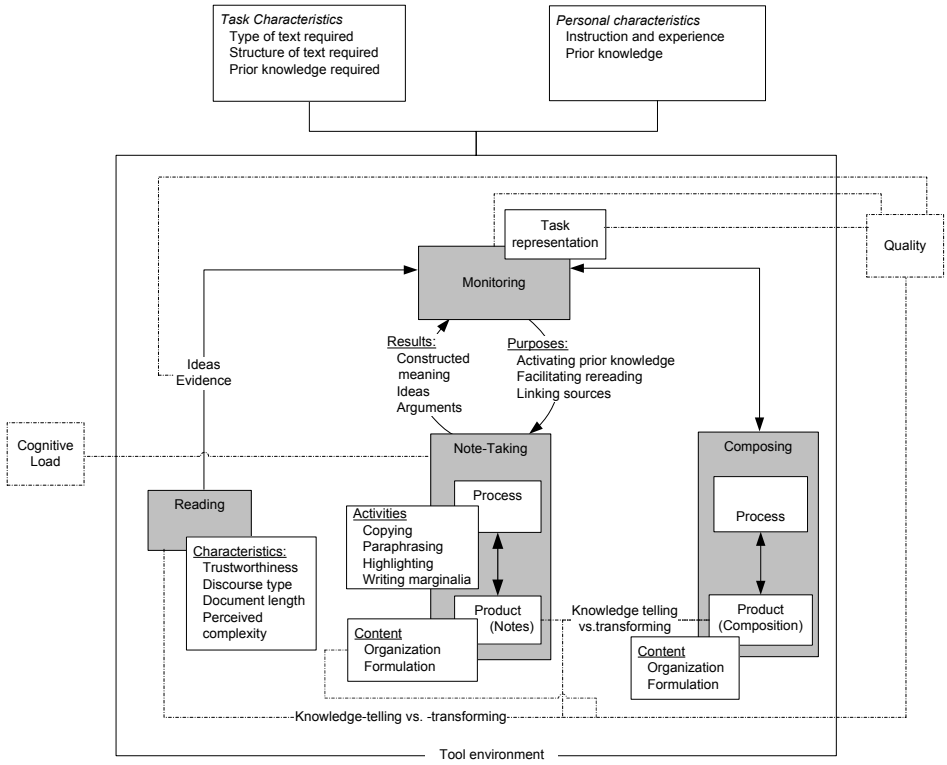
1.12 Conclusions

In this chapter we have discussed the available research on writing-from-sources. Based on this discussion we have constructed a framework of the writing-from-sources process. This is depicted in Figure 1.8 on the next page.

The framework shows the recursive nature of the writing-from-sources process with an active monitor as a control unit that integrates and plans the subprocesses of evaluating sources, taking notes, and composing. This monitoring process is controlled by the task representation. Based on this task representation, writers evaluate the sources, take notes, and compose their essays. Characteristics of the sources that have been shown to influence the extent to which the sources are used for the final text are incorporated into the framework.

Note-taking is central to the process of writing-from-sources. It is the first step in transforming information from the sources to an argument that can be used in the final text. Writers do so by carrying out various activities, including writing marginalia, paraphrasing, and highlighting: competent writers are not passive processors, but active readers (Kennedy, 1985).

Figure 1.8 Analytical Framework of the Writing-from-Sources Process



The characterization of the writing-from-sources process enables us to identify the factors that influence the process and the outcome (the final text) of writing-from-sources. Process differences were found regarding:

- Prior knowledge
- Task representation and the resulting planning of the process
- The manner in which source documents were evaluated
- The purposes for which notes are used

These process differences influenced the outcome of the process, the final text. Differences were found regarding:

- Extent to which a knowledge-telling and knowledge-transforming approach is followed
- The origin of the ideas in the new text – prior knowledge or the sources
- The extent to which notes were used for the final text
- The quality of the new text

Since note-taking is central to the writing-from-sources process, it may be assumed that approaches to the writing-from-sources task are mirrored by approaches to taking notes. By studying note-taking, we can increase our understanding of the writing-from-sources process as a whole. Therefore, in this thesis we study the process of writing-from-sources with respect to the factors we have identified in this chapter.

The factors that were found to affect the writing-from-sources process to a large extent have up till now been analysed within a specific educational setting and a paper environment. Little is known about the role that note-taking can play during writing-from-sources tasks in a non-educational setting in an on-screen environment. To learn about this process, we set up a pilot study that seeks to explore note-taking within the process of writing-from-sources on screen and within a non-educational context. As a secondary goal, we seek to learn more about the methodology that is most appropriate for studying on-screen note-taking, since this has not yet been investigated within a writing-from-sources context.

An Exploratory Study on Writing-from-Sources and Note-Taking on Screen

Chapter 2

In this chapter we report on the background, setup, and results of a pilot study whose aim was a) to explore writing-from-sources on screen with a focus on note-taking and b) to establish the appropriate methodology to study the process of writing-from-sources.

2.1 Introduction

In the previous chapter we summarized and reviewed the literature on writing-from-sources, which resulted in a framework of the writing-from-sources process. This framework formed the basis for the design of the pilot study to be described in this chapter. In this study, (semi-) professionals carried out a writing-from-sources task in a completely on-screen environment, using a website with source documents and a digital notepad to take notes.

The context of the pilot study differs from earlier research with respect to the following elements:

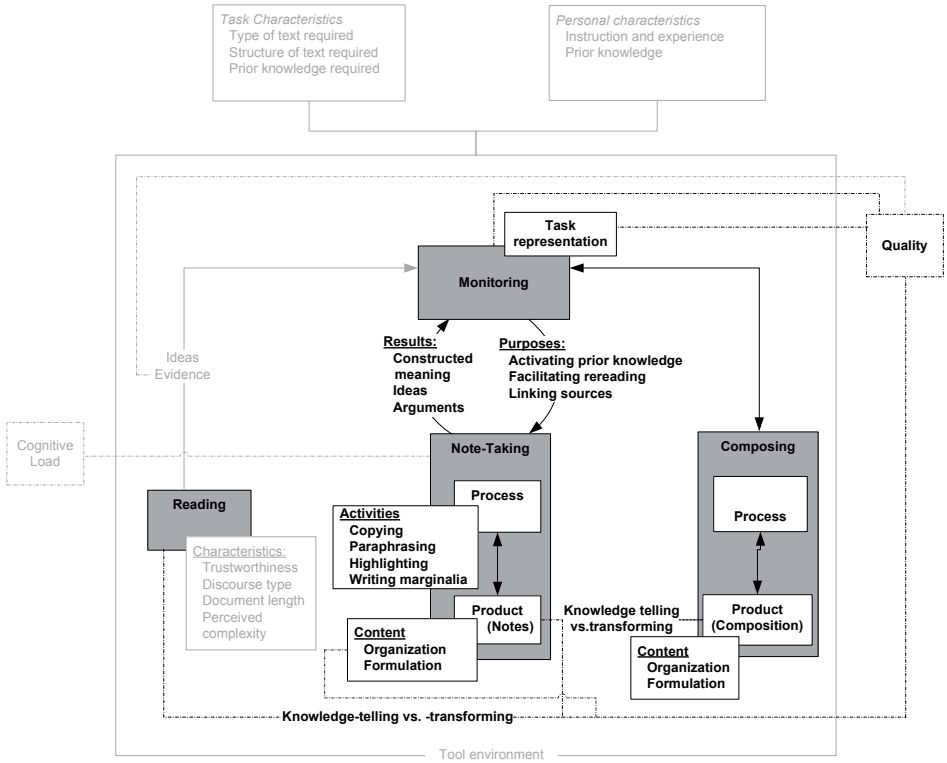
1. *Quality measurement*
   The discussion of writing-from-sources research has shown that in writing-from-sources research little attention is paid to the effectiveness of the final text. Therefore, in this study we explore the relationship between different approaches to note-taking during a writing-from-sources task and the *quality* of the final text as a measure for effectiveness.

2. *The setting*
   Writing-from-sources studies pay little attention to how professionals carry out a writing-from-sources task. In addition, the assignments provided to the participants are unspecific about the precise characteristics the required text had to comply with. Therefore, we decided to set up a study that increases our understanding of *professional* writing-from-sources. This encompassed the construction of a more specific writing task – an advisory paper rather than an 'essay' – and the involvement of (semi-) professional participants rather than young students.

3. *The tool environment*
   In earlier research on writing-from-sources, tasks are almost exclusively carried out in a paper environment. In this study, the professional participants carry out a writing-from-sources task exclusively on screen. That is, writers read, write, and take notes on screen without making use of any paper. By investigating a completely on-screen process, we can highlight the effects of the tool environment on the process of writing-from-sources.

The writing-from-sources framework formed the basis for the research questions in this pilot study. The framework is depicted in Figure 2.1.

Figure 2.1 Writing-from-sources model with emphasis on the focus of the pilot study



In Figure 2.1 we have highlighted the parts of the framework that will be investigated in this pilot study. We seek to identify relationships between the Monitor, Note-Taking, and Quality. Our analyses are guided by the following research question:

> Is the quality of a well-founded composition related to the process and contents of the notes?

The literature review in Chapter 1 has indicated that writers benefit from taking notes during writing-from-sources tasks. When we focus on note-taking, we expect to learn about the writing-from-sources process as a whole. Apart from learning about the writing-from-sources process within the context described above, the secondary purpose was to learn about which methodology would be most suitable to investigate the writing-from-sources process within this context.

2.2 Method

2.2.1 Participants

Seven Master students of Technical Communication (four male, three female) participated in the study. The majority of the participants were employed as technical communication professionals. For the benefit of this thesis we have given the seven participants fictitious names, running from A through to G. The names correspond with the participants' gender.

2.2.2 Tasks

The participants were each given two writing-from-sources tasks. We provided two tasks to make the results less dependent on the characteristics and effects of a specific task.

- *The animation task*
  The first task dealt with the use of animations in an educational website for 12-year-old students. The participants were asked to write an advisory paper with well-grounded recommendations to a website designer on the appro-priateness of animation (rather than static visuals) for explaining the effects of eating too much fatty food.

- *The intranet task*
  In the second task, called the Intranet task, the participants were asked to provide well-founded recommendations about the structure of an intranet site. A fictitious client had to be convinced whether an intranet home page should contain many menu items or just a few.

Because most previous research on professional reading and composing is based on very general tasks that leave much room for interpretation by the participants, we decided to provide the participants with a more specific task. In the animation task, we formulated four key questions that should be answered in the advisory paper. These questions will be further referred to as *stock issues*. In contrast, in the intranet task there was only one general question without stock issues being provided.

By varying the task description we expected to gain insight into the role of the task representation that is constructed from the task description. In particular we were interested in the relationship between task representation and note-taking. We expected that a more specific task representation as provided in the animation task resulted in a more purpose-driven approach. In addition, we expected that manifestations of this approach were observable from the notes.

However, initial analyses showed that there were no qualitative or quantitative differences between the two tasks. Therefore in describing the results we make no distinction in the results between the two tasks.

The participants were familiar with the subjects of the task. The order of tasks was evenly balanced across the participants. Both tasks were carried out during the same session with a short break in between.

2.2.3 Materials

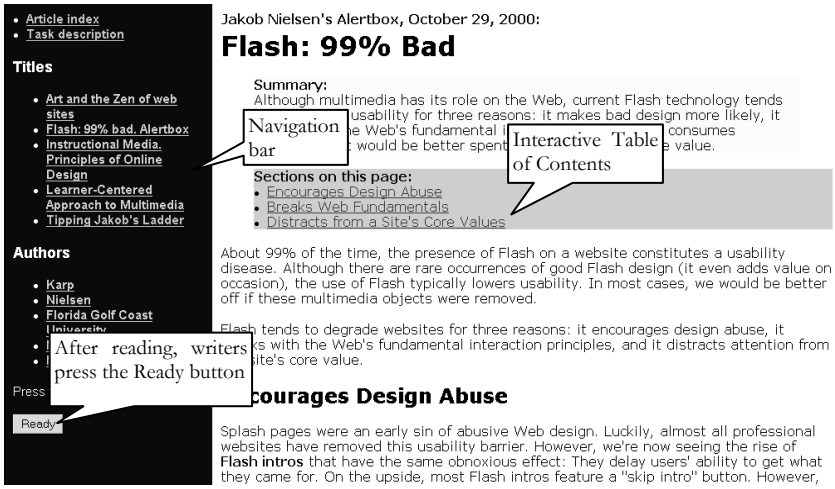
In both tasks, the participants had a set of electronic articles in different genres at their disposal, consisting of research reports, a magazine feature, and a handbook chapter. The article set contained diverse and sometimes contradictory information to induce evaluatory reading, which is characteristic for professionals (e.g. Neutelings, 2001).

During the *reading phase* of the writing-from-sources task, the participants had permanent access to the task description and the articles through a permanently visible navigation bar. However, when they had finished reading and had proceeded to the *composing phase*, they were no longer able to use the reading environment.

The participants, then, could not switch back and forth between reading and composing during the process. In that sense, reading was separated from composing. Although the literature has shown that in writing-from-sources writers alternate between reading and composing, we enforced this separation to explore the role of note-taking as an interface between reading and composing. As McGinely (1992) argues, note-taking is an intermediate step from reading to composing. By enforcing a separation between reading and composing, we can isolate the process of taking notes and learn how it bridges the gap between reading and composing.

In addition, writers knew they could not consult their sources during the composing phase. Consequently, they were aware of a higher need for distributed cognition. That is, they needed to reduce the imposed cognitive load, because it was impossible to keep everything in mind during reading.

Figure 2.2 Sample screen: reading environment for the pilot study



The reading environment is displayed in Figure 2.2. On the left side of the screen a navigation bar is available by means of which writers were able to access the sources. On the bottom-left part of the navigation bar a 'Ready' button was inserted. On the right side of the screen the articles were presented when a participant clicked on a link in the navigation bar. Long articles were divided into sections that were accessible through scrolling or through an interactive table of contents.

The participants could activate the Notepad application of MS Windows whenever they wanted to take notes. Notepad is the digital equivalent of a blank sheet of paper. If taking notes is allowed in 'paper' studies on writing-from-sources, usually a blank sheet of paper is provided to participants. A plain note-taking tool such as Notepad is most similar to such a blank sheet of paper.

2.2.4 Procedure

The study was conducted in the usability lab at the Technical Communication Department of the University of Washington, Seattle. After an explanation of the procedure, the participants were told they could take notes in Notepad, which was already active. Writers could display it on the screen by means of a single click on the window in the task bar.

The participants were free to choose their own approach and were familiar with the Notepad application since it resembles a very basic word processor. They did not report any difficulty in using Notepad. They were not required to take notes, but could do so if they wished.

After reading the first task description, the participants started reading and taking notes. While they were doing this, they were asked to verbalize continuously whatever they were reading, composing, or thinking. If they fell silent, they were prompted to resume thinking aloud. When they had finished reading, they were then asked to click a 'Ready' button, and to proceed with composing out their advisory paper in a new window, referred to as the 'Report window'. They were told that during the composition process they were not allowed to make use of the sources. However, they could use their notes in that phase.

We allowed the participants just 30 minutes per task to read the sources, thereby forcing them to take selection decisions, since 30 minutes was insufficient for reading all information. Selective reading is an activity that is commonly practised by professionals (Bazerman, 1985; Van Duyne, 1983; Neutelings, 1997). In contrast, we did not impose restrictions on the duration of the composing phase. In Table 2.1 the procedure is summarized.

Table 2.1
Procedure Followed in the Pilot Study

Phase	Environment
	Explanation of procedure
Announcing presence of Notepad	Notepad window brought to the forefront
	Carried out by the participant
Reading (30 minutes)	• Sources • Notepad
Ready	
Composing (as long as needed)	• Notepad • Report window

2.2.5 Data Collection and Analysis

To define the relationships between Monitor, Note-taking and Quality, we collected the following data:

- Think-aloud protocols recorded on video
- Notes
- Advisory papers

We created a protocol of each recording by transcribing the participant's verbalisations and adding interactions with the environment (such as activating Notepad, pasting a passage that was copied from the source, or navigating in the sources). The seven protocols were segmented into communication units, similar to the approach followed by McGinley (1992) and Durst (1989), which was derived from Hunt (1965). A communication unit is a distinct, segmentable comment, usually corresponding to T-units including a clause and occasionally subordinate clauses. Each interaction with the environment was also counted as one communication unit.

In order to analyse the formulation and organization of the notes quantitatively, the notes were segmented into clauses. A *clause* was chosen as the unit of analysis. Following Schmitter-Edgecombe & Bales (2005), a clause is narrowly defined as a subject, its verb, and any extraneous modifiers.

2.2.6 Procedure for Measuring the Quality of the Advisory Papers

Because we focus on the relations between advice quality and the model components Note-taking and Monitor, we are not interested in the specific wording of the advisory paper. In that sense, the advisory papers are considered a black box. Since we focus on the quality of the advisory papers, we need an instrument to measure their quality.

In contrast to earlier research, which focuses on educational quality measures, quality is perceived here as the extent to which the composition produced fulfils its function. We tentatively formulated three dimensions that determine whether an advisory paper fulfils its function:

1. *Completeness*: the degree to which the advisory paper addresses every issue that was asked for
2. *Applicability*: the degree to which the advisory paper can be used as guidance for decisions
3. *Persuasiveness*: the degree to which the advisory paper convinces the recipient

We asked 21 experienced web designers to rank the advisory papers on these three quality dimensions. Ten of them ranked the advisory papers for the Animation task, while the other eleven ranked the advisory papers for the Intranet task. The rater went through the seven advisory papers three times, once for each dimension. The order of the quality dimensions was counterbalanced across the raters.

Once a rater had completed one dimension, the experimenter asked him to explain why an advisory paper was ranked on the top, the middle, or the bottom of the pile. When the raters had completed ranking the advisory papers on all three dimensions, they were asked whether they felt other important dimensions of advice quality were missing.

2.3 Results: Relationship between Task Representation, Note-Taking, and Quality

In this section we first address the quality of the advisory papers. Then – in terms of our framework – we focus on the relationship between *Note-Taking* and:

- *Task representation* (as subcomponent of the Monitor)
- *Quality*

2.3.1 Quality of the Advisory Papers

Before we define the relationship between *Monitor*, *Note-taking* and *Quality*, we first present the rankings of the advisory papers. The seven advisory papers in the Animation task were ranked by 10 raters, while the seven advisory papers in the Intranet task were ranked by 11 raters. The 'worst' advisory paper was ranked with a 1, the best with a seven. For each participant, we composed a summated score for their two advisory papers by computing the sum of the *average* rankings in the two tasks. Values can thus range from 2 to 14. The results are shown in Table 2.2.

Table 2.2
Summated Average Advice Quality Rankings per Participant

	Complete-ness	Applica-bility	Persua-siveness
Anne	7.6 (1.1)	6.3 (1.1)	8.0 (2.3)
Bill	6.7 (1.6)	6.4 (1.0)	5.3 (1.4)
Charles	2.1 (.3)	2.5 (1.2)	5.4 (1.6)
Derrick	7.5 (1.8)	7.6 (2.1)	6.3 (1.3)
Emily	7.0 (1.1)	9.3 (.8)	6.1 (1.4)
Fred	9.2 (1.4)	8.2 (2.3)	6.3 (2.0)
Gail	2.8 (1.0)	3.4 (2.2)	5.8 (1.6)

Note. Standard deviations between parentheses

Emily, Fred, and Anne wrote, on average, the best advisory papers, while Charles and Gail received the lowest rankings. Charles' advisory papers were seen as the least applicable and complete, while Fred's advisory papers received the highest rankings on these two dimensions. However, no advisory papers were unanimously considered to be of the best quality as the summated values did not exceed 9.3, while the highest possible ranking was 14.

The average rankings do not provide a reliable quality measure unless there is agreement between the raters on the (relative) quality of the advisory papers. The raters' perspectives on the applicability and completeness of the papers proved to be relatively consistent with each other, indicated by the difference between the lowest and the highest value. Furthermore, the

standard deviations were also relatively low for most advisory papers. If raters had disagreed strongly about the quality of the papers, the figures in Table 2.2 would have demonstrated a strong regression towards the mean. Values would then be clustered around 8 (minimal value of 2 + maximum value of 14, divided by 2), while the standard deviations would have been much higher.

The raters agreed less on the persuasiveness of the papers than on the other dimensions. The values were clustered around 6 and had high standard deviations. Only Anne's advisory papers were seen as more persuasive than the others, even though the standard deviation was high (2.3).

We examined the extent to which the three dimensions actually measure different aspects of advice quality or, alternatively, whether the three dimensions in fact represent one holistic quality ranking. If this were the case, we could average the scores on the three dimensions. This would enable us to define relationships between Note-Taking and a single figure for Quality in our writing-from-sources framework. To test whether advice quality needs to be measured on three dimensions, we computed the partial correlations between the three dimensions. The results are shown in Table 2.3.

Table 2.3
Partial Correlations between Advice Quality Dimensions

	Completeness	Applicability	Persuasiveness
Completeness	-	.60 ***	.36 ***
Applicability		-	.16
Persuasiveness			-

Note. *** Correlations significant at the .001 level

Completeness is significantly related to both applicability and persuasiveness. Based on the explanations raters offered for their rankings, we assume that the raters considered completeness a prerequisite for advisory papers to be applicable and persuasive.

However, the correlations between the three dimensions are not strong enough to capture advice quality in one value. Therefore, in order to discuss the relationship between note-taking and advice quality we will relate aspects of the note-taking process to each of these dimensions separately.

2.3.2 Effect of Frequency of Taking Notes on Advice Quality

To gain an impression of the relationship between note-taking and quality we first computed the percentage of communication units in the protocols that involved an interaction with Notepad. This percentage is seen as an indication of the relative importance of note-taking for the writing-from-sources process. In the protocols, we made a distinction between the following note-taking related activities:

- Announcing that notes will be taken
- Shifting from reading to note-taking, or vice versa
- Copying and pasting passages from the source documents
- Formulating notes
- Re-reading notes

Writers differed with respect to the frequency with which they took notes during reading. We computed the percentage of the communication units related to taking notes. Table 2.4 shows the percentages of the communication units for each type of note-taking related communication units.

Table 2.4
Percentage of Types of Note-Taking in the Protocols

Participant	Announcing note-taking	Shifting	Copying & pasting	Formu-lating	Rerea-ding	*Total*
Anne	2.0	2.9	1.1	3.4		*9.5*
Bill	.9	4.1		2.6	.1	*7.7*
Charles	2.0	9.9	6.4	1.4		*19.7*
Derrick	1.8	7.4	1.8	3.0		*14.0*
Emily	.6	4.0	3.2			*7.8*
Fred	.5	1.6	.6			*2.7*
Gail	2.0	8.3	4.2	4.0	.8	*19.3*

Table 2.4 shows that there are large differences between participants regarding the total percentage of note-taking related communic-ation units. Note-taking consumed close to 20% of the communication units for Gail and Charles, whereas in Fred's protocol only 2.7% was devoted to note-taking. The average number (m=11,5, sd=6,4) suggests that note-taking plays an important role during the process of writing-from-sources.

As can be seen from Table 2.4, the two most important components of the note-taking percentage are the shifts from reading to note-taking and copying and pasting of passages, whereas formulating notes consumed a relatively low percentage of the protocol fragments.

We can also see large differences in the distribution of note-taking activities across the participants. In particular, Charles frequently copied citations to Notepad, while he switched back and forth from reading to note-taking. In contrast, Anne was very restrictive in copying citations. She tended to formulate her own notes. We will return to these differences in Section 2.3.3, since these differences might be explained by the different task representations of both participants.

What would the relationship be between the frequency with which they engage in activities related to note-taking as measured by the total percentage of communication units and the quality of the advisory papers? To explore this relationship we computed the correlation between this percentage and the three average advice quality rankings. Since numbers are too low, we could not compute correlations for each category of the communication units related to note-taking separately. The correlations between the total percentage of note-taking in the protocols and the three advice quality dimensions are shown in Table 2.5.

Table 2.5
Correlations between total % of Note-Taking Related Communication Units and Advice Quality

	Completeness	Applicability	Persuasiveness
Note-taking %	-.63 *	-.55 *	

Note. * p<.05. Only significant correlations are shown.

As can be seen from Table 2.5, note-taking was negatively related to both completeness and applicability. The more notes were taken, the lower the completeness and applicability were perceived by the raters.
This is surprising, since earlier research provided only evidence for the *beneficial* effect of note-taking (See Section 1.10.1). It could be that shifting back and forth from reading to taking notes frequently distracted the participants. Whereas Distributed Cognition emphasizes the benefits of using external artefacts such as notes, the shifting from reading to note-taking, and the assumed distraction it causes, suggests that there is a downside to using such external artefacts.

The negative relationship between taking notes and advice quality may disappear when a note-taking tool is provided that does not require shifting back and forth from reading to note-taking. A tool is then required that enables writers to take notes in the same window they use for reading.

Analysing the frequency with which notes are taken can provide only a rough indication of how taking notes is related to quality. To analyse this relationship in more detail we have to analyse the role that taking notes plays during the writing-from-sources process. The negative relationship between the frequency with which notes are taken and the quality of the advisory paper may be explained by writers' task representation. Therefore, in the next section we examine the relationship between note-taking and task representation.

2.3.3 Influence of a Knowledge-Telling and Knowledge-Transforming Approach to Note-Taking

In Section 1.2.1 and Section 1.8 it was shown that the writers' task representation influences the selection and evaluation of information, as well as how notes are taken. A detailed task representation helps writers to select information and decide what is relevant for the advisory paper and what is not. Taking notes is then a reflection of the writers' task representation.

In the present study, various manifestations of participants' task representations were found within the notes and within protocol fragments. Writers relate information they have read to the task description, they revisit and reread the task description, and they evaluate information in the light of the task with expressions such as (*"I don't think this has anything to do with what I'm looking for. It has nothing to do with education"*, 5A40560).

Large differences were found with respect to the specificity of the task representation. These differences appeared to affect the process of taking notes to a large extent, in particular with respect to how writers supplement their notes with headings. We will discuss the impact of the task representation based on the distinction between the knowledge-telling and knowledge-transforming models of the composition process as proposed by Bereiter & Scardamalia (1987). Here we discuss the processes of Anne, Gail, and Bill. These processes illustrate the different task representations that were found.

Anne is an example of a participant with a task representation that for the main part reflects a knowledge-transforming approach to the task. In her Intranet task, Gail seemed to combine elements of knowledge-telling and knowledge-transforming. Bill's task representation reflected a knowledge-telling approach to the writing-from-sources task.

Anne proved to have a highly specific task representation. She selected and evaluated information, based on the rhetorical problem she was trying to solve. Her note-taking behaviour mirrored her selection and evaluation behavior. After encountering information concerning the core issues of the task, she prepared a section in the Notepad window with a title that corresponded to one of these issues. For instance, she provided the section about the first stock issue ("Can animations help children to understand and learn about a process like the one described?") with the title 'Instructional issues'. This issue was translated into a reading goal. Her reading goal was to look for evidence that confirmed her hypothesis: "*animation works best for showing processes" (1A1940).* She monitored her task progress by evaluating what she had read with what she needed: *"So far I don't see anything that compares the use of animation to non-animation" (1A1620).* She took notes when the information was considered useful.
In sum, Anne's notes reflected a dominance of the rhetorical problem over the content problem in her task representation.

In her second task Gail worked in a systematic manner based on two self-devised questions that were central to the task. In spite of these questions, the sources themselves influenced her reading, selection, and note-taking behaviour to a large extent. Interestingly, Gail commented on the lack of questions in the Intranet task description, which was her second task: *"There are no questions to guide me here. So try to think of own" (7I56970-80).*

The two core questions she formulated herself formed the basis for the headings in her notes: After dividing the Notepad window into two sections, she explained: *"I felt like I had to come up with some questions" (7I58563).* During the reading process, she fleshed out her notes, while repeatedly revising her questions. Apparently, she adapted her task representation – as reflected in the headings of the notes – to the sources she was reading.

In contrast to Anne and, to a lesser extent Gail, Bill is an example of a participant who had a very unspecific task representation. Bill appeared to have trouble building a task representation. He returned to the task description several times because he wanted to make sure that he was still on the track. According to Bill, the task concerned children and animated illustrations. Thus, Bill reduced the task description to, in terms of Bereiter & Scardamalia (1987), to two topic identifiers (children and animated illustrations). This behaviour reflects a knowledge-telling approach. Para-graphs were relevant if they contained one of these topic identifiers. *"Interesting"* was his most common reaction to potentially relevant information.

His note-taking behaviour resulted from this task representation and thus from his information selection. While reading, he predominantly read passages in a linear manner,

paraphrased them and made a note if they contained terms that occurred in the task description. The notes Bill took were mostly stated in keywords, such as "equipment" and "software". On one occasion, Bill was unsure whether the information he had read was important enough to make a note. Before starting typing, he said: *"I don't know if these will be issues, but…" (2A11430).*

In conclusion, in contrast to Anne, Bill's note-taking behaviour reflected a dominance of the content problem over the rhetorical problem. Bill's task represent-tation is typical for most of the participants. These participants were working in a less purpose-driven manner than Anne and (to a lesser extent) Gail. Because most of the participants were heavily influenced by what they were reading, their note-taking behavior resembled knowledge-telling more than knowledge-transforming.

Some participants (in particular Charles) did not formulate their own notes in Notepad, but copied lengthy citations from the source documents. These participants tentatively selected information they considered relevant for the final advisory paper. The modification of that information to a text that fulfils the rhetorical goals was deferred until the composition stage.

In conclusion, the task representation proved to influence the information selection, and - closely tied to information selection - the process of taking notes. According to Bereiter & Scardamalia (1987) a task representation based on topic identifiers is characteristic for a knowledge-telling approach. Whereas a tentative positive evaluation sufficed for participants with such a task representation to take notes, participants with a more elaborated task representation (Anne and, to a lesser extent, Gail) only took notes after first evaluating the information they were reading in the light of the task and its potential use for the advisory paper. This approach is characteristic for knowledge-transforming.

2.4 The content of the notes

In the previous section we focused on the process of taking notes. This section addresses the content of the notes. We focus on the effect of different note-taking approaches to formulating and organizing the notes on the quality of the advisory papers since these approaches proved to result in different performance in an educational setting (See Section 1.10.1).

2.4.1 Effect of Formulation on Advice Quality

The participants also differed in terms of the formulation of their notes: while some of them resorted to writing notes themselves, others copied information verbatim from the sources. To assess the extent to which writers engage in a knowledge-transforming process, we examined the notes with respect to the modifications the writers carried out on information from the sources. We examined every clause in the notes and classified them as either copied or modified. A clause was identified as being modified when it was not copied verbatim from the sources. Table 2.6 shows the number of clauses for each category.

Table 2.6
Number of Copied and Transformed Clauses in the Notes

Participant	Copied	Modified	Total
Anne	19	45	64
Bill		18	18
Charles	111	23	134
Derrick	8	20	28
Emily	35		35
Fred	48		48
Gail	49	16	65
Total	*270*	*122*	*392*

Note. Numbers indicate the number of clauses

As becomes clear from Table 2.6, the participants differed with respect to the extent to which they modified information from the sources to the notes. Most participants copied far more passages to the notes than they formulated themselves. Charles appeared to copy citations frequently, while he formulated only the headings himself. These headings contained references to the articles.

A closer inspection of the clauses that were classified as 'modified' revealed that writers engage in a variety of transformations. Some of them are a reflection of knowledge-transforming. For instance, Anne's notes contained draft advice (*'consider having Flash in a pop-up window'*) and pointers to prior knowledge (*'Shneiderman, interface design guru'*). Other transformations were more low-level, containing paraphrases of information. As mentioned before, Bill paraphrased information in his notes with keywords such as *'equipment'* or *'software'*.

The knowledge-telling and knowledge-transforming models as proposed by Bereiter & Scardamalia (1987) suggest that knowledge-transforming is superior to knowledge-telling. If this were the case, the extent to which writers engage in knowledge-transforming should be reflected in the quality of the advisory papers. We therefore computed the correlation between the percentage of modified clauses – as indicator of a knowledge-transforming approach – and the rankings of the advisory papers on each of the three dimensions of advice quality. The three correlations were not significant ($p>.41$): no relationship was found between the percentage of modified clauses in the notes and the quality of the advisory papers.

Apart from the relatively low number of participants, it is possible that writers did not refrain from modifying the information, but only deferred it until the composition stage. In that case, potential effects of modifying information in the light of rhetorical goals on the quality of the papers are not visible, because they are moderated by a writers' approach during the composing phase.

2.4.2 Relationship between Organization of the Notes and Advice Quality

In this section we examine the relationship between the organization of the notes and the quality of the advisory papers. Both in writing-from-sources research (see Section 1.10.1) and composition research (see Section 1.2.2), the organization of the notes was found to discriminate between different task approaches. The effect of these approaches to note-taking and to writing-from-sources in general is yet unknown.

We analysed the notes with respect to the relation between their organization (the principle the author applied in order to group notes together) and advice quality. Within an educational context it has become clear that organizing notes under headings (for instance in a hierarchical or matrix structure) improved the performance of the students(Kiewra et al., 1995). Thus, organizing notes under headings appears to influence task performance. Therefore, we sought to explore the effect of organizing notes under headings within the context of the present pilot study. Clauses were considered headings if:

1) They covered the topic of the clauses that immediately follow
2) They are visually distinguishable from other clauses by a preceding blank line and a subsequent new line

Analysis of the headings demonstrated that the notes are provided with two types of headings. Headings that reflected the task's core issues (such as 'Technological issues', or headings that reflected the articles from the sources (such as the title 'Flash: 99% bad'). Other clauses in the notes were not supplied with a heading at all.
Table 2.7 shows the number of headings and the number of clauses that were shared below these headings.

Table 2.7
Number of Clauses below Subdivided by Type of Headings

Participant	Issue	Source	No heading [a]		Total
Anne	3 (15)	6 (41)	(8)	9	(64)
Bill			(18)		(18)
Charles		4 (123)	(11)	4	(134)
Derrick		4 (28)		4	(28)
Emily			(35)		(35)
Fred			(48)		(48)
Gail	2 (22)	5 (43)		7	(65)
Total	*5 (37)*	*19 (235)*	*(120)*	*24*	*(392)*

Note. Numbers indicate the number of headings. Numbers between parentheses indicate number of clauses. [a] This column indicates the number of clauses that were not supplied with a heading

Table 2.7 shows that in taking notes, participants primarily followed the sources they were reading. Only 37 of the 392 clauses were shared under issue-related headings. Only Anne and Gail organized their notes according to the task's main issues. They organized their notes according to issues such as 'Instructional issues' or 'Depth vs. Breadth'.

It was found that 235 clauses were supplied with a heading that referred to the article from which they were derived. Writers prepared a section in the notes for each article they were reading. The purpose of organizing the notes according to this principle was to be able to make proper references to information from the articles during composition. Derrick stated *"I want to be sure to connect… these articles with their writers this time around, so I can make better reference to them." (4A34850).*

The remaining 120 clauses were not provided with a heading. They reflected the order in which the information was read: writers copied citations from the notes and pasted them in the notes below the citations that were already copied and pasted.

These differences in the extent to which participants selected information from the sources and shared it under an issue-related heading could have affected the quality of the advisory papers. To define the relationship between Organization of the notes and Quality, we computed correlations between the relative number of unorganized clauses, clauses organized according to the articles, and clauses organized according to the task's issues. These correlations proved not to be significant ($p > .70$), indicating that the way in which writers organized their notes is not related to the quality of the advisory papers.

This is a surprising result since according to Scardamalia & Bereiter (1987) a linear organization of the notes is an indication of knowledge-telling, whereas a non-linear organization is an indication of knowledge-transforming.

Although no direct relationship was found between the manner in which writers organize their notes and the quality of the advisory papers, organizing the notes was related to the *reading* process. When writers organized their notes according to the task's core issues, we saw that it helped them to plan their reading process and monitor its progress. For instance, while looking at her notes Anne said: *"But we haven't had a comparison of learning with animation versus learning with straight text and pictures"* (1A1780) and then started searching for that particular information.

Gail changed the headings of her notes whenever the text she read raised an issue she felt was central to the task. Ultimately, 'hierarchy or not hierarchy' and 'breadth vs. depth' were the two issues that defined her Intranet task. She then tried to find information that resolved these issues. Thus, the notes helped her to keep focused on the most important issues of the task.

However, using the notes to monitor the task's progress did not affect the writing-from-sources process to such an extent that it resulted in higher advice quality, as correlations between advice quality and the organization of the notes did not reach statistical significance levels.

In sum then, most participants organized the notes in accordance with the knowledge-telling model of writing-from-sources. Although this manner of organizing notes had no negative relationship with advice quality, we observed that Anne and Gail benefited from organizing the notes according to the task's issues. This approach to organizing notes reflects a knowledge-transforming approach.

2.5 Discussion

In this section we will return to the model of writing-from-sources and sketch the relationships that were the topic of investigation. As a conclusion of the discussion topics presented in this section, we will draw lessons for the methodology of the main study.

2.5.1 Relationship between Note-Taking Process and Quality

This pilot study has shown that note-taking plays an important role in the process of writing-from-sources. The high percentage of protocol fragments dedicated to note-taking shows that writers devoted much attention to this subprocess. But the strategies they choose are rather different: writers applied a variety of strategies. Most participants' note-taking approach reflected knowledge-telling, with the copying of passages as the dominant note-taking activity. The results provide tentative evidence that a high frequency of note-taking is negatively related to the perceived completeness and applicability of the advisory papers. The results do not demonstrate a relationship between the contents of the notes and advice quality.

The ease with which writers could copy and paste clippings may have encouraged the writers to do so, while in contrast much more effort was required for formulating one's own notes. In terms of the Distributed Cognition framework (Hutchins, 1995a), the ease with which writers were able to coordinate the use of external artifacts for their writing-from-sources process influenced the use of information. The pilot study has shown that on-screen artefacts like the notes here not only enable writers to off-load cognitive effort, but that interacting with these artefacts can result in lower performance, possibly because of the attention shifts between reading and taking notes.

Switching back and forth between reading and note-taking may have prevented the participants' ideas from evolving from topic identifiers that were derived from the task description to a detailed view about the rhetorical problem (composing an advisory paper such that it convinces its recipient) and the content problem (what to include in the advisory paper) that has to be addressed.

If indeed the large attention shifts – caused by switching back and forth between reading and note-taking – and the additional cognitive effort caused the negative relationship between note-taking and advice quality, writers would be able to construct a more specific task representation if they were provided with a tool that allowed them to take on-screen notes on the sources themselves. Such a tool would be an aid to adopting a knowledge-transforming approach, rather than the knowledge-telling approach we observed in the approach taken by the majority of the participants in the pilot study.

Hence in the main study we provide a tool that affords a knowledge-transforming approach to the writing-from-sources task. To further investigate the influence of this tool on the cognitive effort that is required for the task, in the main study we will measure not only the cognitive load of the task, but also the cognitive load that the note-taking tool imposes on the writers.

2.5.2 Relationship between Note-Taking and the Monitor (Task Representation)

In chapter 1 we identified the task representation as a factor that influences the whole writing-from-sources process. This observation is confirmed by the results from the pilot study: the task representation proved to be of influence on the selection and evaluation of information, as well as on the manner in which notes are taken.

It appeared that for both Anne and Gail the relationship between – in terms of our framework – 'Note-taking' and the 'Task representation' was bidirectional: they took notes based on what was relevant according to their task representation, while the headings in the notes guided the information selection and evaluation process: both Anne and Gail were looking for passages to flesh out the sections in their notes. For the other participants, we were able to find only a one-way relationship: the notes functioned as an external storage of potentially relevant information. Once stored in the notes, the information did not influence the process any further.

Bereiter & Scardamalia (1987) claim that writers progress from knowledge-telling to knowledge-transforming as their writing skills improve. Inexperienced writers demonstrate a knowledge-telling approach, while expert writers tend to transform knowledge. Only Anne and, to a lesser extent, Gail demonstrated a knowledge-transforming approach. The approach of the other participants primarily reflected the knowledge-telling model. This is somewhat surprising, since the Master students with (more or less) professional experience were assumed to have more experience with writing tasks than the students that are employed in most writing-from-sources studies.

For all participants, the note-taking behaviour was an expression of the author's task representation. Copying passages (as Charles did) or paraphrasing information using keywords (as Bill did) were reflections of a knowledge-telling approach to note-taking: the notes consisted of information that was selected from the sources based on a limited set of topic identifiers. Most participants followed this approach. In contrast, Anne and Gail demonstrated note-taking behaviour that reflected the knowledge-transforming model. They organized their notes non-linearly according to the task's issues. In addition, Anne also wrote draft advice in her notes.

We expected the approach of participants in our study to show closer similarity with the knowledge-transforming model, since most of them had professional experience. Nevertheless, the possibility cannot be ruled out that gaps in prior knowledge regarding the task's topic and experience with the writing-from-sources task contributed to their knowledge-telling note-taking behaviour. These deficiencies may have resulted in a task representation that is based on topic identifiers aimed primarily at solving the content problem rather than the rhetorical problem.

Because we focus on a truly professional context, in our main study we will employ professionals whose knowledge and experience is relatively undisputed.

2.5.3 Relationship between Contents of the Notes and Quality

Our results did not provide evidence for a relationship between the Contents of the notes and Quality. The majority of the notes were organized according to the articles they were derived from. However, when writers did organize their notes according to the task's most important issues, participants (Anne and Gail) were found to benefit from this organization, since it helped them to monitor task progress. The organization of the notes according to the task's main issues can be considered a reflection of a knowledge-transforming approach (Bereiter & Scardamalia, 1987).

With respect to the formulation of the notes, we found that writers most frequently copy citations from the source documents to their notes. It is only when they are composing their advisory papers that they modify the information and adapt it to the rhetorical situation in the advisory paper. They defer the transformation process.

The prescribed phasing of the writing-from-sources process into a separate reading and composing phase may provide an explanation for the deferring of the transformation process. It could be that writers envisioned the writing-from-sources task prior to composing as a task of collecting relevant information. This could have reduced their awareness of the rhetorical goals, resulting in a knowledge-telling approach to the writing-from-sources task.

To induce a knowledge-transforming approach, in the main study we will provide a tool that allows writers to organize their notes easily, while at the same time providing them with the task's main issues to test whether they will then follow an approach that has a stronger resemblance with the knowledge-transforming model (Bereiter & Scardamalia, 1987) than we observed in this pilot study. In addition, we will not separate reading from composing in the main study, to prevent writers from envision-ning the writing-from-sources task as an information collection task.

2.5.4 Influence of the Tool Environment on the Writing-from-Sources Process

In this study, professionals carried out a writing-from-sources task in a completely on-screen environment, using a website with source documents and a digital notepad to take notes. The tool environment that was provided to the participants may have afforded the note-taking behaviour we saw in the majority of the participants. Simply because it is so easy to copy and paste citations from the source documents, writers did make use of this opportunity. In other words, the tool environment induced a knowledge-telling approach to taking notes.

Since Bereiter & Scardamalia (1987) consider knowledge-telling a reflection of non-expert behaviour, and the pilot study suggests that the tool environment may afford a knowledge-telling approach, for the main study we will construct a tool environment that encourages a knowledge-transforming approach. The design of this environment aims at making it easy for users to take self-formulated notes or comments and to create headings or categories for their notes.

2.5.5 Conclusion

We can tentatively conclude that most writers demonstrate a knowledge-telling approach to writing-from-sources when they carry out this task entirely on screen. Note-taking was found to be a reflection of writers' task representation.

To encourage professional writers to take a knowledge-transforming approach, we will carry out a study in which the tool environment affords such an approach. The outline of this study is described in the next chapter.

Outline of the Main Study

Chapter 3

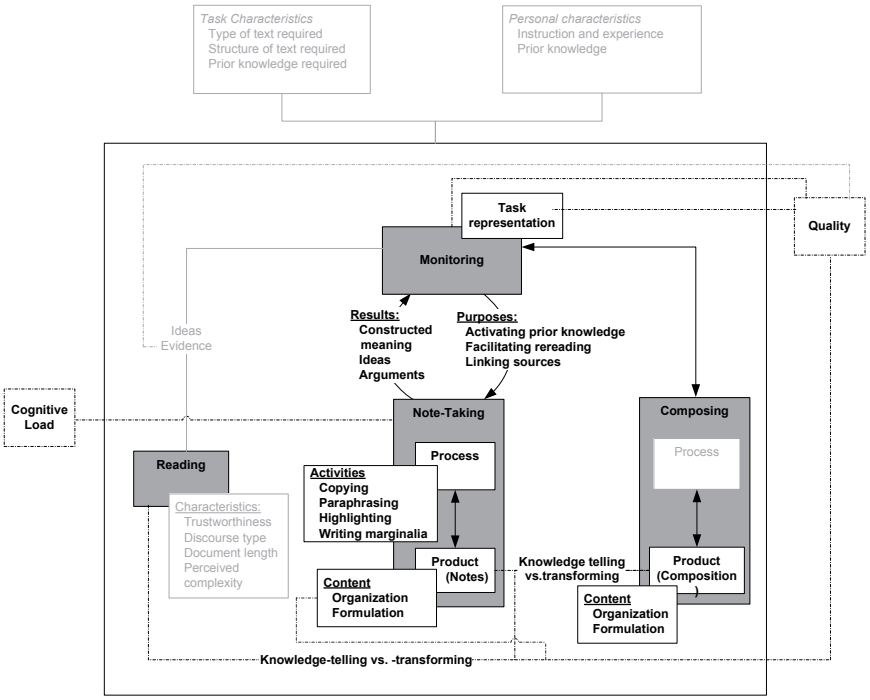
3.1 Introduction and Research Questions

The pilot study and our literature review in Chapter 1 have shown that note-taking is an important part of the writing-from-sources process. Substantial variety was found between participants in terms of the approach writers take with respect to note-taking, and in terms of the content of the notes. It was found that taking notes in the tool environment significantly affected the process of writing-from-sources and, in the case of copying citations, also the quality of the advisory papers.

The precise manner in which taking notes on screen contributes to the process of writing-from-sources and to the final composition is not yet clear, neither from the pilot study nor from previous studies on writing-from-sources. The contribution of particular note-taking activities to the writing-from-sources process and the purposes for which these activities are carried remain to be investigated. The contribution of on-screen note-taking to the process of writing-from-sources and to the final composition is the topic of the main study in this thesis.

In Figure 3.1 we have highlighted the parts of our writing-from-sources frame-work that are the topic of investigation for the main study.

Figure 3.1 Framework of the writing-from-sources process



The research questions we seek to answer for these parts of the writing-from-sources framework are displayed in Table 3.1.

Table 3.1
Research Questions in terms of the Writing-from-Sources Framework

Framework element	Research question
1. Purposes	For which purposes do professionals take notes when they are engaged in an on-screen writing-from-sources task?
2. Tool environment Note-taking – Activities Note-taking – Content	How does the tool environment affect the process and product of note-taking?
3. Relationships between • Evaluating sources • Note-Taking • Composing	How do writers use on-screen sources and notes to compose their advisory paper?
4. Relationship between Cognitive load – Notes	To what degree do note-taking activities affect the cognitive load writers experience during an on-screen writing-from-sources task?
5. Relationships between • Note-taking – Quality • Composition – Quality • Cognitive Load – Quality	What is the relationship between the notes, the advisory paper, cognitive load, and quality in an on-screen writing-from-sources task?

In the pilot study we have drawn lessons about the methodology of studying on-screen note-taking in writing-from-sources tasks (see Section 2.5). Compared to the pilot study for the main study, we:

- *employ 'real' professionals instead of Masters students*
- *set up a tool environment that encourages knowledge-transforming early on in the process*
  That is, we provide a tool to half of the participants by means of which wri-ters can easily take self-formulated notes. In addition, half of the participants were provided with the important issues of the task by means of keywords.
- *allow writers to switch back and forth between reading and writing instead of separating reading from writing*
- *measure cognitive load of the task and the tool*

The details of the methodology will be described in the next sections.

3.2 Design

In the main study, we introduced two independent variables: the tool writers could use for taking notes, and the availability of stock issues.

- The note-taking tool

  The most dominant note-taking activity in the pilot study was copying passages from the text. But the literature on writing-from-sources distinguishes between various other note-taking activities that can be interpreted in terms of the degree to which they reflect a knowledge-transforming approach. We summarize these activities in Table 3.2. The last column describes whether these activities could be accomplished with the tool that was provided in the pilot study.

Table 3.2
Note-Taking Activities and their Assumed Level of Modification

Activity	Level of modification	Possible with the pilot tool
Paraphrasing	High	Yes
Writing comments on the sources	High	No
Copying	Low	Yes
Highlighting	Low	No

Half of the participants is provided with a tool that induces a knowledge-transforming approach. Because we want to observe the effect of manipulating the tool that writers can use to take notes on the process of writing-from-sources in general and on the process of knowledge transforming in particular, we decided to provide a tool that allows writers to take notes on the sources themselves by highlighting, or by writing comments in the margins, and by organizing the notes in a meaningful way. In terms of O'Hara et al. (2002) the attention shift between reading and note-taking is smaller for these note-taking activities than for taking notes in a separate window.

Commenting and highlighting are different from copying and paraphrasing since they generate notes closer to the sources compared to a separate sheet of paper or, in a digital environment, a different window. Commenting on the sources affords a deeper evaluation of the information. Whereas participants in the pilot study evaluated information based on a limited number of topic identifiers, the opportunity to comment directly on the sources may encourage a deeper evaluation, because the attention-shift from reading is smaller, making it easier to record the evaluations in a note.

In addition, when users are enabled to take these types of notes, they may start to relate the information to the rhetorical problem in an earlier phase of the process, resulting in notes that display significant modifications compared to the information in the sources: a knowledge-transforming approach to note-taking.

The other half of the participants were provided with the same tool as in the pilot study. The note-taking tool in the pilot study seemed to induce a knowledge-telling approach: participants frequently copied and pasted citations, possibly *because* this was quite easy to do.

By examining the use of these types of notes, we can learn about how a note-taking tool can induce a knowledge-telling or knowledge-transforming approach to the writing-from-sources task. The condition in which a tool is provided that affords a knowledge-transforming approach is referred to as the '*marker condition*', whereas the condition that affords a knowledge-telling approach is referred to as the '*notepad condition*'.

- Stock issues

As argued in Chapter 1, a knowledge-transforming approach includes interpreting the assignment with respect to content and rhetorical situation. In the pilot study we found indications of the transformation process being deferred until the composition stage. As a result, evaluating the sources was found to be relatively unfocused. This is surprising, since in earlier research professional readers were found to read in a highly purpose-driven manner (Bazerman, 1985; Neutelings, 1997).

To encourage a knowledge-transforming approach, we provided the writers with a conceptual framework by means of categories that reflected the task's stock issues. Within the context of note-taking during lectures, it was found that students who organized their notes into a hierarchical framework performed significantly better than students who merely listed their notes (Kiewra et al. 1995).

We assumed that providing such a framework in the context of a writing-from-sources task would encourage the interpretation of information in the light of the task. Therefore, we introduced Stock issues as the second independent variable in our study.

We summarize the design of our study in Table 3.3. The tool that affords a knowledge-transforming approach by means of which writers can take notes on the sources is referred to as the 'marker condition'. The condition in which writers take notes in a different window using the same tool as in the pilot study is referred to as the 'notepad condition'.

Table 3.3
Experimental design

Stock issues	Tool	
	Notepad	Marker
Not provided	I	II
Provided	III	IV

3.3 Tool Environment

In this section the experimental manipulations are further explained for both the notepad condition and the marker condition.

3.3.1 Notepad Conditions

The tool to be provided to the participants should meet the following criteria:

1. *Users should be induced to copy and paste citations or to write down their own comments from the source documents in a separate window.*
   In the notepad condition, the tool was required to induce a knowledge-telling approach to the task. Based on the pilot study we can conclude that the opportunity to copy-and-paste citations quickly can result in a knowledge-telling approach. Therefore, the opportunity to copy-and-paste citations was introduced as a requirement.
   Because we wanted to enable participants to choose their own note-taking approach and make their own decisions on the extent to which they deemed it useful to copy-and-paste citations, we also introduced writing down comments as a criterion for the note-taking tool.
   Thus, copying passages and writing down comments – as basic features of both paper notes and electronic word processing – were the only features the tool was required to offer.

2. *Users should not be burdened with the availability of formatting functions*
   If formatting functions had been made available, participants might have confused the window in which the advisory paper had to be written with the application that was provided for note-taking. Therefore, a basic application without formatting functions was sought in order to avoid distraction.

Microsoft Notepad matched both criteria that were formulated for the note-taking tool. Notepad is the same application that was provided in the pilot study. In the pilot study Notepad proved to induce a knowledge-telling approach to note-taking. To highlight the effect of a tool that affords a knowledge-transforming approach it seemed to be desirable to provide the other half of the participants with a tool that in-duced a knowledge-telling approach. The Notepad application is shown in Figure 3.2 on the next page.

3.3.2 Marker Conditions

In the marker condition, an advanced marker tool was used that affords users to take a knowledge-transforming approach. This tool meets the following criteria:

1. *Users should be able to highlight passages and write comments in the margins in a similar way as they mark up their paper documents.*
   Writers highlight passages and write comments on the sources frequently. Using the marker tool to highlight passages and write comments was assumed to afford a knowledge-transforming approach. By observing writers choosing their own note-taking approach, we are able to gain insight into the role a complex note-taking tool can play during a writing-from-sources task.

Figure 3.2. *Screenshot of the Notepad Application*

2. *Users should be able to organize their markings by grouping them under categories and by reviewing the markings in an overview.*
   Organizing notes requires a deeper level of processing than simply collecting the notes. Offering a feature that allows writers to organize their notes may encourage the writers to engage in a knowledge-transformation process. Hence a tool was sought that offered such an opportunity.

   For half of the participants, the stock issues had already been introduced in the marker tool as headings, whereas the other half were allowed to create their own headings. Participants in the marker condition with stock issues had to be able to add headings if they desired.

   Writers may benefit from organizing their notes. Organizing notes could have a beneficial effect on its own, but combining this with an overview through which writers can review their markings will probably result in superior performance, since in an educational setting organizing and reviewing notes has proven to be beneficial for students (see Section 1.3).

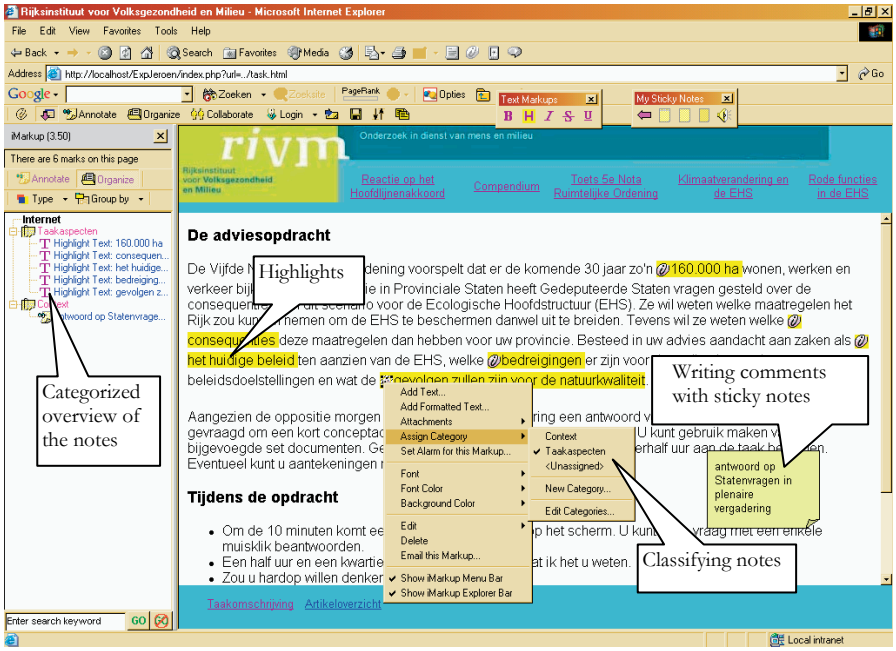
   Therefore, the tool to be selected should enable participants to organize and review their notes by means of an overview.

3. *Users should be able to manipulate the tool using interaction principles with which they are already familiar through word processing or through using the operating system.*
   Distributed Cognition suggests that by using external artifacts such as notes, writers need to spend less cognitive effort. But when this positive effect on cognitive load is neutralized by an additional effort of manipulating a complex new interface, no positive effect of note-taking can be observed. Therefore, the tool must be easy to manipulate.

   When participants are already familiar with the interface principles that are used in the tool – such as drag & drop – the cognitive effort of using a new tool is much lower. Therefore, easy manipulation was introduced as a selection criterion for the tool.

After performing a search on internet, *iMarkup* (http://www.imarkup.com) seems to fit our purposes best. The program is designed for collaborative writing. For both the marker condition with and without Stock issues provided, iMarkup satisfactorily implemented the features that were associated with the criteria that were formulated for the marker tool. Figure 3.3 shows a screenshot of iMarkup.

Figure 3.3 *Features of iMarkup*



3.3.3 Report window

In both the notepad condition and the marker condition, writers were able to write the final text in a report window. Because we did not want to make the environment too complicated, we decided to provide the participants with a simple text box in a browser window. The components of the tool environment are shown in Table 3.4.

Table 3.4
Components of the Tool Environment

Notepad condition		Marker condition	
Sources		Sources	
Notepad	With stock issues	iMarkup	With stock issues
	Without stock issues		Without stock issues
	Report window		Report window

3.4 Task

In this study, participants were asked to write an advisory paper based on a set of extensive documents, just like a set of documents was provided in the pilot study. A task was constructed that encouraged readers to formulate their own advice based on information in multiple sources. The scenario sketched in the task description required participants to deliberately take the rhetorical situation into account. Time constraints were imposed to simulate the time-pressure of many professional writing-from-sources tasks. In Figure 3.4 the resulting task description is displayed. An explanation of the core terms related to the topic of writing is provided in Appendix B.

Figure 3.4 The task description

Stel u werkt als provincieambtenaar voor de Gedeputeerde die ruimtelijke ordening in zijn of haar portefeuille heeft. De Vijfde Nota Ruimtelijke Ordening schetst een scenario, waarin er in de komende 30 jaar zo'n 160.000 ha wonen, werken en verkeer bijkomt.	Let's imagine you are working as a province civil servant for the Gedeputeerde that has spatial planning in her portfolio. The Fifth Ministerial Memorandum on Spatial Planning outlines a scenario in which some 160.000 ha for residence, work and traffic purposes will be added in the coming 30 years.
Enkele leden van een groene partij in Provinciale Staten hebben uw Gedeputeerde vragen gesteld over de consequenties van dit scenario voor de Ecologische Hoofdstructuur (EHS). Ze willen weten welke maatregelen het Rijk zou kunnen nemen om de EHS te beschermen danwel uit te breiden. Tevens willen ze weten welke consequenties deze maatregelen hebben voor uw provincie.	Some members of a green party in Provincial Parliament have asked your Gedeputeerde questions concerning the consequences of this scenario for the Dutch Mainframe of National Landscapes (EHS). They want to know what measures the government could take to protect and/or extend the EHS. At the same time, they want to know what consequences these measures will have for your province.
Uw Gedeputeerde heeft u gevraagd een kort conceptadvies uit te brengen. Besteed in uw advies aandacht aan zaken als het huidige beleid ten aanzien van de EHS, wat de consequenties zijn van het hierboven geschetste scenario voor de realisatie van de beleidsdoelstellingen, welke maatregelen genomen kunnen worden om de realisatie van deze beleidsdoelstellingen te bevorderen, en wat de gevolgen zijn van deze maatregelen zijn voor de natuurkwaliteit.	Your Gedeputeerde has asked you to produce a short draft recommendation. Pay attention in your recommendation to issues such as the current policy with respect to the EHS, what the consequences are of the scenario outlined above for the realisation of the policy goals, what measures can be taken to stimulate the realisation of these policy goals, and what the results of these measures will be for the environmental quality.

This task required the participants to interpret the rhetorical situation, including the political situation the Gedeputeerde is in. The task description contained four issues the participant had to deal with: current policy regarding the EHS, consequences of the urban expansion scenario, potential actions and their consequences for ecological quality. These issues were not presented

as an exhaustive list, leaving the participants room for their own interpretation. The issues were included in the task description in order to help the participants define the issues that should be dealt with.

While all participants were given the same task description, for the participants in the conditions with provided stock issues, the four themes of the task were permanently available via their tool for taking notes. The keyword-style stock issues were 'current policy', 'consequences of goals', 'measures' and 'consequences for ecological quality'.

Since writing-from-sources is a challenging task for writers, it could be that the cognitive load of this task influences the extent to which the tools for taking notes are used. Distributed Cognition (Hutchins, 1995a) suggests that writers can offload cognitive effort to the notes. But it may be that the complexity of using a tool – interacting with the interface, planning to use it effectively – adds to the cognitive load of the task itself rather than reducing it.

To assess the influence of cognitive load as predictor of tool use, cognitive load was measured throughout the writing-from-sources task.

3.5 Sources

A website has been designed that forced the readers to be selective in what to read and what to use for their advisory papers as well as encouraging them to take their own stance towards the topic of the task. For reasons of ecological validity, different types of existing available documents were selected.

Five lengthy documents were made available by the RIVM. The RIVM is the National Institute for Public Health and the Environment. It is a research institute on epidemiological, environmental and health issues. As such they are an advisory body for the government. Apart from purely scientific publications, the RIVM publishes state of affairs reports (for instance the Environmental Balance 2006, MNP, 2006), and policy evaluations.

The sources for this study were also publicly available on the RIVM website, which is intended for both the general public and for policy makers. The documents the participants could use were:

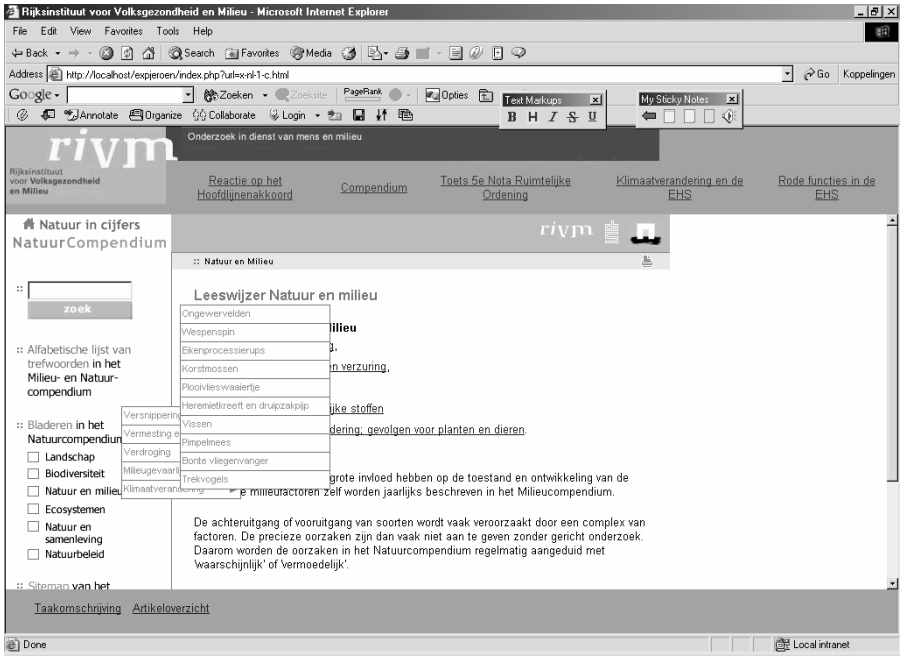
1. *"Reactie op het hoofdlijnenakkoord"*("Response to the coaliation agreement")
   Document (1686 words) evaluating the effects of the current cabinet's policy proposals in terms of ecological and environmental quality.
2. *"Toets Vijfde Nota Ruimtelijke Ordening"* ("Assessment of the Fifth Memorandum on Spatial Planning")
   Document (3054 words) describing and assessing the merits of the policy measures regarding urban and landscape planning introduced in the Fifth Ministerial Memorandum.
3. *"Klimaatverandering en de EHS"* ("Climate change and the EHS")
   Press release (518 words) arguing that climatological changes demand interconnected nature reserves.
4. *"Rode functies in de EHS" (*"Red functions in the EHS")
   Document (2153 words) evaluating the current state of affairs regarding building within EHS regions. The term 'red' is used to indicate built areas.

5. *"Milieu- & natuurcompendium"* ("Environmental data compendium")
   An over 3000-page database, containing facts and figures on environment and ecology. The pages were made accessible through a menu system. The search function was disabled because it would have searched only the database instead of all documents. This would have confused the participants. An example of this database is given in Figure 3.5 below.

The first four documents are of a highly argumentative nature, while the database was merely describing the current state of affairs. Because the sources were argumentative and did not take identical positions, participants needed to form their own opinion about the texts and about which information was valid and applicable enough to be used for their own argumentation.

To give an impression of the website the participants used, it is displayed in Figure 3.5. In the content part of the website, between both blue navigation bars, the "Milieu & Natuurcompendium" is displayed with its menu opened on the left side of the screen.

Figure 3.5 *Facts and figures database "Milieu & Natuurcompendium"*



In the questionnaire, participants were asked whether they were familiar with each of the documents. On average, participants were familiar with two out of the five documents (m=2.22; sd=.1.65). Between the four conditions, no differences were found in the number of documents participants were familiar with.

3.6 Participants

As this experiment seeks to explore the effect of the marker and notepad tool on a writing-from-sources task within a professional context, participants were sought who were working in the public administration sector in positions related to spatial planning and environment. Experience and prior knowledge within this field were the criteria for including participants in the study.

A complete list of all employees working in this field for provinces or related institutions was used to recruit the participants. Thirty-one employees of the Dutch provinces and seven employees of related institutions such as the Royal Dutch Institute of Public Health and Environment were willing to participate in this experiment. Although the task was aimed at Dutch provinces, related institutions had to be involved as the number of available participants within provinces proved to be insufficient.

The participants had between 2 and 36 years experience within public administration with an average of 17 years (sd=9). They had moderate experience in writing advisory papers (on a five-point scale m=2.7; sd=.8). According to their self-reports, participants were relatively well aware of the current policy regarding landscape planning (on a five-point scale m=3.4; sd=1.0). Twenty participants indicated that they had received their Master's degree, thirteen reported they had completed higher vocational education (comparable to bachelor level), two had completed their intermediate vocational education, while the other three had graduated from secondary school.

The participants were between 26 and 59 years old (m=45, sd=8.4). With respect to their experience in using the Web, half of the participants used internet on a daily basis for their work. Ten participants used the Web once or more a week, while the remaining 9 participants used it less than once a week.

More men (n=28) than women (n=10) participated in this experiment, which was not surprising since this difference also occurred in the list of possible participants. Men and women were equally divided among the conditions (Fisher's exact test n.s.)

3.7 Data collection

The following data sources were derived from the writing-from-sources process the participants were engaged in:

- *Verbal protocols*

Taking notes is not a random process, but is the result of an author's conscious decisions. As such, taking notes is the result of certain 'cognitive activities' (Breetvelt et al., 1994). To analyse the cognitive activities during reading, taking notes, and composing, participants were asked to think, read, and compose aloud. Thinking aloud is a common approach used to gain insight into the cognitive activities that are carried out during verbal (problem-solving) tasks, such as reading, writing, and writing-from-sources. Participants were asked to verbalize every thought that came into their minds. When participants kept silent for longer than 30 seconds, a prompt was given ("Could you please continue to think aloud?"). The period in which silence was allowed is longer than usual to minimize interference with the complex writing-from-sources process.

A video camera was used to record the screen as well as the verbalisations of the participants. The participants themselves were not recorded in a recognizable way.

- *Cognitive load questionnaire*

To measure cognitive load, every ten minutes a card containing two questions was presented to the participant concerning the difficulty of the task and the difficulty of using the marker tool or the notepad tool.

Examining the research on cognitive load, Karreman (2004) identified three ways in which cognitive load can be measured:

- By measuring physiological responses
- By analysing secondary task performance
- By subjective ratings

Subjective ratings are by far the easiest way to measure cognitive load. After a fixed time-lapse throughout the task, participants are asked how difficult the task is for them at that particular moment. They can indicate their answer on a nine-point scale. Within instructional research, Paas et al. (1994) found that subjective ratings were able to successfully differentiate between different levels of mental activity, and concluded therefore that subjective ratings were a valuable tool for measuring cognitive load.

Following Paas et al. (1994), in the current study every ten minutes participants were asked to indicate on a nine-point scale how difficult the task was for them at that particular moment, and how difficult it was to use the note-taking tool.

- *Notes*

To store the notes, a screen dump of every mouse click was stored from which both the instances in which notes were taken and the contents of these notes could be derived. Additionally, every key stroke was logged, including texts that were copied and pasted.

- *Advisory papers*

Similar to the notes, the advisory paper is analysed as it is submitted at the end of the process. The specific revisions are not analysed since the focus of our research question is on the modification of information from sources, to notes, to advisory paper.

- *Questionnaire*

To acquire background information and to assess appreciation and usefulness of the tool provided, a questionnaire was administered. The questionnaire can be found in Appendix C. Predominantly closed questions were included regarding the topics that were assumed to be factors that could influence the participants' approach to the writing-from-sources task:

- Demographics (age, gender, educational level)
- Knowledge about and experience with the topic of the task (4 questions)
- Familiarity with the source documents (5 questions)
- Experience within public administration and with writing advisory papers (2 questions)
- Experience with using websites (2 questions)

Additionally, participants were asked for an evaluation of the writing-from-sources process and the contribution of the tools for taking notes. Questions were included regarding:

- *Appreciation for and usefulness of the note-taking tool during the writing-from-sources process (8 questions)*
  The appreciation and the estimated usefulness provide an indication of how writers perceive the role that taking notes plays during the writing-from-sources process. In terms of the research questions, appreciation and usefulness contribute to our understanding of the purposes for which notes were taken and the contribution of these notes to the final advisory paper.

- *Quality of the advisory paper as perceived by the author himself/ herself (3 questions)*
  How writers estimate the quality of their own advisory paper is an indication of how difficult the writing-from-sources task is for participants.

3.8 Data analysis

To answer the research questions, a number of analyses was carried out, which will be described in this section.

3.8.1 Inventory of actions related to taking notes

To answer the research question on the purposes of taking notes, we will analyse the *instances* in which notes are taken. A list was made of every action related to the process of taking notes. The following actions were identified as note-taking:

- Marking or transferring information verbatim
  1) Highlighting passages (marker condition)
  2) Copying-and-pasting citations to Notepad (notepad condition)

- Transferring information verbatim to the report window (both conditions)
  1) Copying and pasting citations to the report window (both conditions

- Commenting on information
  1) Writing comments in sticky notes (marker condition)
  2) Adding comments to highlights (marker condition)
  3) Writing comments in Notepad (notepad condition)

- Organizing notes
  1) Assigning a category to notes (marker condition)
  2) Creating categories (marker condition)
  3) Grouping notes under headings (notepad condition)

In both conditions, copying and pasting citations (that is, passages from the source documents) to the report window were interpreted as a form of taking notes as it is conceived as an intermediate step from the formulation of information in the sources to the eventual composition. As such, copying and pasting citations to the report window has the same function as separate notes or markings.

In the marker condition, organizing the notes consisted of assigning categories to highlights or sticky notes, and creating or modifying categories. In the notepad condition, organizing notes consisted of grouping notes under headings.

After the *instances* of note-taking were examined, the *contents* of the final version of the notes were analysed. Thus, intermediate products are not analysed, since the analysis focuses on the contribution of the notes to the advisory paper. Modifications to the notes prior to the use of these notes offer little value added for this analysis since these intermediate products only reflect part of the processing the participant has carried out.

3.8.2 Case selection and analysis

To identify the variety of purposes and activities of taking notes, a set of protocols was transcribed and coded. It was assumed that the variety of purposes and activities becomes most visible when the differences in the extent to which participants take notes are maximized.

For each condition, therefore, the process with the minimal, median and maximal number of notes were computed and fully transcribed, resulting in 4 x 3 protocols. The selected twelve protocols (referred to as *cases*) were segmented into communication units, similar to the approach followed by McGinley (1992) and Durst (1989), derived from Hunt (1965). A communication unit is a distinct, segmentable comment, usually corresponding to T-units containing a clause and sometimes subordinate clauses. Segmentation into communication units enables the researcher to analyse changes in strategies and/or behaviour. The approach followed here differs from Kennedy (1985), who used "clear indications of changing behavior as segmentation rule" (p. 442). In Kennedy (1985) when multiple sentences written (or read) are verbalized, they are counted as one unit, while in this case they are counted as multiple units. This is desirable since the content of what is written is also the subject of investigation rather than just the transitions from writing to other behaviour. Using communication units is the most common approach in writing-from-sources research.

Next, communication units were coded according to the subprocess (i.e. reading, taking notes, or writing) to which they referred. The scheme was an adaptation of the coding schemes of Langer (1986), McGinley (1992), and Breetvelt et al. (1994). We used sample protocols from this study (outside the set of 4 x 3 cases) to further develop the scheme. The scheme needed to be elaborated because the unique context of this study, and decisions or activities that result from that context, were evidently not entirely covered by former research. The coding scheme with examples from the protocols, and the coding frequencies, are discussed in detail in Section 4.3.

The twelve cases are used to study in detail which cognitive activities writers perform before and after taking notes, as well as the purpose for which they take notes. The cases were also used for the advice quality ratings discussed in Chapter 7.

3.9 Procedure

The experiment was conducted in the participant's office or in another room where no disturbance was expected and in which participants felt comfortable. The experiment consisted of six phases:

1. *Introduction*
   After explaining the purpose of the study, participants were asked to read and sign a consent form in which the design of the study, the tasks they were asked to do, and the way the data were going to be used (emphasizing protection of their privacy) were explained. They were asked to confirm that they understood what they were being asked to do, that their participation was voluntary, and that they gave permission to collect the data in the way described in Section 3.7.

2. *Demonstration of the note-taking tool*
   In the marker condition, the tool (iMarkup) was demonstrated to the participants in order to teach them how to use it. All features of the tools were shown twice. After the demonstration, a short five-page manual was given to the participants. Using the manual, participants were asked to familiarize themselves with each of the features. After that, a quick reference guide derived from the manual was given to the participants, which they were free to use throughout the entire process. However, participants appeared not to make use of the manual. If questions arose, they were inclined to ask the experimenter rather than use the manual.

   In the notepad condition, it was also shown what could be done with Notepad. However, as participants were assumed to be familiar with word processors, they were not asked to practice beforehand. A manual was also considered unnecessary.

3. *Exploration*
   The participants were given the opportunity to explore the available sources before being asked to read the task description. By browsing quickly through the pages, they could get a sense of the information that was available on the website and how the website could be used.

   They were asked to pay particular attention to the tables of content and navigation within and between documents to avoid interface problems during the task itself.

   While the participants were becoming familiar with both the contents of the documents and the navigation between them, they were also asked to think and read aloud so that they could become accustomed to this procedure.

   This phase of the process, further referred to as the exploratory phase, lasted for between 5 and 15 minutes. After 15 minutes had passed, they were asked to proceed with the task itself.

4. *Inserting stock issues*
   When the participants felt they were ready, in the conditions with stock issues provided the stock issues were inserted into the notepad or marker tool by the experimenter. In the condition without stock issues, the participants immediately started reading the task description.

5. *Writing the advisory paper*
   After reading the task description and when the task was clear, the participants started reading, writing and taking notes as they wished. Participants were allowed to spend 90 minutes on the entire task (the exploratory phase and the task itself). The experimenter gave a prompt thirty minutes and fifteen minutes before the end of the 90-minute period.

   Every 10 minutes, participants were asked to indicate on a nine-point scale how difficult they considered the task at that particular moment and how difficult it was to use the note taking tool.

6. *Questionnaire*
   After they had completed the task, they were requested to fill out the questionnaire.

7. *Debriefing*
   When they had completed the questionnaire, a token of gratitude was offered.

3.10 Structure of the Next Chapters

In the subsequent chapters, the results of the study that has been outlined in this chapter are described and discssed. Chapters 5 through 7 each deal with one of the research questions on the purposes and activities of note-taking (Chapter 5), the use of sources and notes for the advisory paper (Chapter 6), and the relationship between notes and the quality of the final advisory paper (Chapter 7). However, the answers to the research questions are provided within the broader scope of the writing-from-sources task. Participants' general approaches to this task provide the framework against which their note-taking behaviour should be interpreted. For that reason, the next chapter (Chapter 4) seeks to provide a description of the writing-from-sources process.

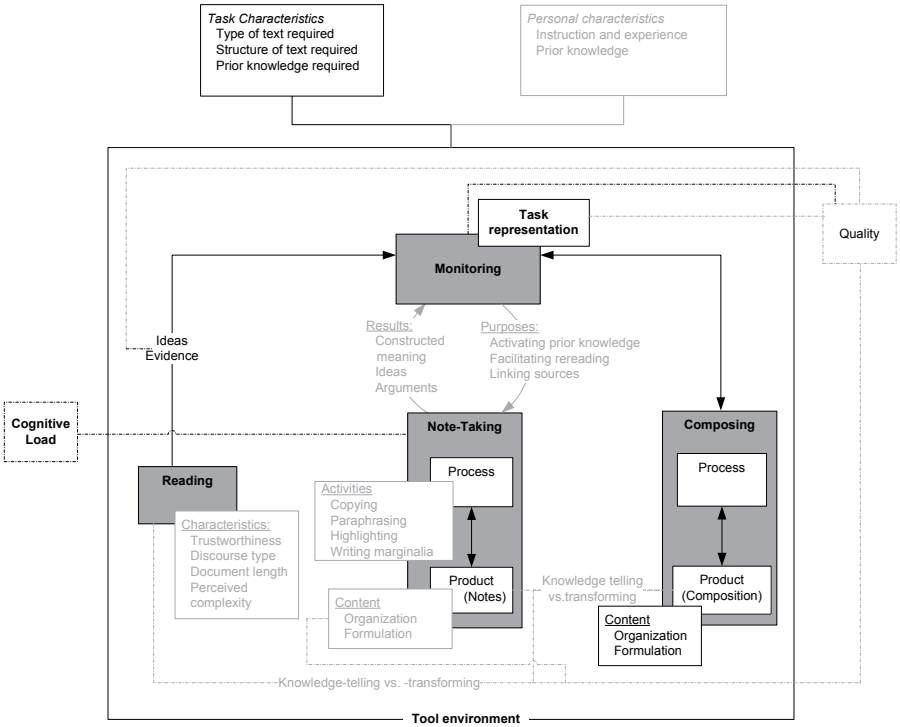
Overview of the Writing-from-Sources Process

Chapter 4

4.1 Introduction

In this chapter a descriptive overview is given of the writing-from-sources process with the purpose of demonstrating what participants do during the 90 minute writing-from-sources task. This overview should be considered as the background against which the analysis of the notes from the chapters to follow should be interpreted. After all, the role of note-taking cannot be considered without taking into account the other subprocesses of evaluating the sources, and composing, because the sub-processes are strongly interrelated (as discussed in Chapter 1.6). The components that will be addressed in this chapter are highlighted in Figure 4.1.

Figure 4.1 Writing-from-sources framework with the focus of the qualitative and quantitative analysis emphasized.



In Section 4.2 we first present a *qualitative* description of the twelve processes based on the highlighted components of our writing-from-sources framework.

For the qualitative descriptions we selected twelve participants based on the number of instances in which they took notes, as described in Section 3.8.1. The minimum, maximum, and median number of note-taking activities were determined, resulting in a selection of 12 processes. The advisory papers that resulted from these processes can be found in Appendix E.

The highlighted framework components were also the basis for coding the twelve think-aloud protocols. The coding results provide a *quantitative* overview of the writing-from-sources process. The quantitative results illustrated with sample commu-nication units will be presented in Section 4.3.

4.2 Qualitative Summary of the Process

In this section an overview is provided of the twelve writing-from-sources processes that were fully transcribed and coded. We describe the processes based on the model components from Figure 4.1.

4.2.1 Monitoring and Task Representation

All participants demonstrated a purpose-driven task approach. At the start of the process they proved to spend considerable effort on reading and interpreting the task. They constructed a task representation by composing the introduction to the advisory paper, or by taking notes. The notes that writers took to construct a task representation depended on the tool they were allowed to use. In the marker condition, participant 1 and 19 highlighted parts of their task representation, while in the notepad condition some participants paraphrased (7, 24, 39) or copied (11) parts of the task description to Notepad.

The purpose-driven nature of the writing-from-sources process is observable in participants' explicit consideration of the rhetorical and political context of the advisory paper. In the protocols of participants (7, 8, 19, 38) we found comments that reflect such considerations:

(P19#0:42:39)[2]	*"dat zit ik ook al hardop te denken aan welke gedeputeerde die vraag zou stellen en wat haar stokpaardjes zijn"*
	["I'm thinking aloud about that too, which 'member of the Gedeputeerde 'would ask that question and what her particular hobby horses are"]
(P38#0:37:50)	*"ja wij moeten het altijd zo bondig mogelijk houden, maar, haha"*
	["yeah, we always have to keep it as short as possible, but, ha ha"]

The task representation manifests itself in reading, and in taking notes. Writers evaluated what they were reading in the light of the task. For some participants the issues they considered most important for the task formed the basis for their note-taking. In the marker condition, participant 4 proved to categorize her notes according to the task's most important issues, whereas in the notepad condition participant 39 frequently reread the task's stock issues that were provided in Notepad.

[2] Expressions of participants are indicated with their respondent number (P19), and a timestamp measured from the start of the exploratory phase (0:42:39), separated by a hash (#)

4.2.2 Reading

The primary functions of reading the sources proved to be:

- To gain an understanding of the field
- To collect evidence
- To generate new ideas

While all participants used their prior knowledge during the writing-from-sources process, participant 5 proved to be relatively unfamiliar with the task's topic. Therefore, to gain an understanding of the field, he first studied two documents he considered useful. He expressed his comprehension problems as follows:

(P05#0:11:35) *"ik heb er geen verstand van, dat blijft toch wel erg lastig, vrees ik"*
["I don't know the first thing about it, I'm worried that's going to give me some real problems"]

The most important function of reading the sources was to collect evidence in order to substantiate the claims presented in their advisory papers. For instance participants used facts from the Compendium (the facts and figures database):

(P39#0:44:42) *"Ja nou dacht dat dat wel aardig zou zijn om die nog even cijfermatig op te nemen"*
["Yeah well I thought it would be useful to have that in figures"]

Apart from substantiating the advisory paper, the sources also helped some participants (5, 9, 38) to generate ideas for the content that should be included in the advisory paper. For instance, participant 19 stated:

(P19#0:54:42) *"dan zal ik hier nog eens even goed kjiken of dat werkelijk niets toevoegt"*
["then I'll have another good look to see if that really isn't adding anything extra"]

The task's core issues formed the basis for reading and evaluating the sources. For some participants (7, 11, 24, 19) the task not only influenced the topic of the infor-mation they were looking for, but also the type of information. For these participants the advisory paper determined the type of information that was needed. For instance, participant 7 said:

(P07#1:28:23) *"minder de rijks, de rivm notities hierop nagevlooid, maar ik denk dat dit voor 'oogpunt van het beantwoorden van…deze vragen van de groene Statenfractie, toegespitst op de Friese situatie dat dat belangrijk is"*
["less the State, studied the RIVM notes on this, but I think that this with a view to answering … these questions of the green party in the provincial parliament, focused on the Frisian situation, that that is important"]

Such considerations suggest an awareness not only of the issues for which they need information, but also of the type of information (such as statistics, or policy descriptions) that would best serve the rhetorical goals.

Because participants appeared to be guided by the task issues and the rhetorical goals, they rarely lost themselves in the information from the sources. This happened only to participant 27, who voiced his lack of focus on the task as follows:

(P27#0:35:55) *"Sjongejonge ik ga toch weer even terug naar, naar die opdracht want ik weet zo langzamerhand niet meer wat de vraag is"*

["well well well, I'll go back to that after all, to that assignment because I'm beginning to lose sight of what the question is"]

Participants not only differed with respect to the functions the source fulfilled during the process, but also with respect to the value they thought the sources had. They critically evaluated the contents for their potential usefulness.

Approximately half of the participants (4, 7, 8, 10, 11, 19, 24) primarily relied on prior knowledge to substantiate their advisory paper. They spent little effort on reading the sources, because they had their doubts about their relevance in relation to the goal of the advisory paper. A typical remark on the sources' usefulness was:

P11#0:28:52 *"ik ben eigenlijk op zoek naar een eh meer beleidsmatige invalshoek, maar die zit er dus niet in, dus die moet ik zelf gaan maken vanuit eh die detailgegevens"*

["I'm actually looking for a, uhm more policy-related approach, but that's not in here so I'll have to make that myself, based on the, uhm detail data"]

4.2.3 Note-Taking

Note-taking played a significant role throughout the process. As mentioned in Section 4.2.1, most writers took notes to construct a task representation. In the marker condition the notes kept playing a significant role in the remainder of the process, while in the notepad condition note-taking declined considerably. Participants in all conditions copied and pasted passages to their advisory papers.

Notepad condition

In the notepad condition the note-taking tool was occasionally used to monitor task progress and to write the advisory paper. Participant 8 reread the task's stock issues on various occasions. Re-reading these issues helped the participant to keep focused on the task.

Two participants (27, 39) used Notepad to write their advisory papers because they had more space available there compared to the report window that was provided for writing the advisory paper. Participant 27 stated:

(P27#0:35:55) *"Weet je wat ik ga eventjes naar dat kladblok want daar kan ik meer tekst op kwijt volgens mij. Dan maak ik het iets overzichtelijker. Even een leermoment"*

["you know what, I'm going to that notepad because I think I can get more text in. Then I can make it a bit more structured. A small learning moment"]

During the process their notes evolved from notes to an advisory paper in the sense that the modified notes constituted their advisory paper.

Marker condition

Apart from increasing their understanding of the task, participants in the marker condition used the marker tool to collect information by highlighting passages, or to apply structure to the advisory paper by writing sticky notes. For instance, early in the process, participant 19 added two sticky notes to her task description. In these sticky notes she wrote an outline as well as – in keywords – the necessary content for the advisory paper. She added a sticky note and explained for which purpose she wanted to use it:

(P19#0:07:42) *"wat ik al eh voorbarig eh wil aangeven van eh wat er in het advies moet komen"*

["what I already uhm prematurely want to indicate uhm what must be put into this advisory paper"]

We noted differences in the extent to which the participants deemed highlighting passages useful prior to copying or paraphrasing information in the advisory paper. Participant 24 and participant 1 explicitly expressed their doubts about the usefulness of highlighting passages:

(P24#0:22:39) *"maar ja je gebruikt het niet dus…ja ik vind het gewoon makkelijker om stukjes tekst…meteen naar je advies te kopiëren dan dat je weer eerst binnen zo'n tekst allerlei stukken gaat kopie…, gaat markeren"*

["yeah but you don't use it so… yes I just find it easier to copy bits of text… straight away to the advisory paper, than when you first start copying all kinds of stuff within such a text…, to start marking"]

Participant 1 decided to copy passages immediately to his advisory paper after he realized that it was not immediately necessary to highlight it first before copying it to his advisory paper:

(P01#0:20:18) *"Ik kan 'm ook wel gelijk gaan kopiëren in eh, en erin gaan plakken"*

["I might just as well copy it straight away and uhm then paste it in"]

In contrast to others, some participants benefited from the two-step process of highlighting and subsequently paraphrasing or copying passages. For participant 38, the highlights provided a summary of the process:

(P38#0:44:46) *"nou, zo'n, notities zijn voor een samenvatting natuurlijk altijd erg handig"*

["Well, such, notes are of course always very handy as a summary"]

In the last part of the process, participant 38 reviewed his highlights and copied some of the relevant ones to his advisory paper. Participant 4 followed a similar approach. In addition to collecting useful information for the advisory paper, she also used the highlights to keep focused on the task:

(P04#0:12:55) *"En het iMarkup is handig want dan kan ik zien welke vragen ik in ieder geval moet beantwoorden"*

["and iMarkup is handy because then I can see which questions I have to answer in any case"]

Only a few participants commented on difficulties with manipulating the tools. In the notepad condition, participant 7 expressed his difficulties as follows:

(P07#0:23:08) *"hoe moeilijk vindt u 't om Notepad te gebruiken op dit moment. Dat is het hele gemanouevreer"*

["how difficult are you finding, uhm it to use Notepad at this moment. That's to do with the whole manoeuvring business"]

In the marker condition, participant 19 experienced substantial trouble with manipulating the tool. Her sticky notes got mixed up because she did not know how to remove them and move them around effectively. She expressed the consequences of manipulating the tool as follows:

(P19#0:34:20) *"inmiddels begint de tijd ook te dringen als het echt tot een advies moet leiden dan ben ik nu al een half uur bezig met allerlei gepruttel eh in de marge"*

["I'm running out of time now if this really has to become an advisory paper then I've already used up half an hour just doodling uhm in the margins"]

4.2.4 Composing

The composition process differed among participants. Most participants started composing early in the process, while in contrast some participants wrote their advisory papers only after collecting the information they needed for the paper. Some spent long periods of time merely on composing, using their prior knowledge to generate the content, while others switched back and forth from reading to composing using the information from the sources.

In examining the organization of the advisory papers, we found that a group of participants used the issues that were raised in the task description as the primary organizing principle, whereas other participants applied a self-created scheme (for instance a problem-solution scheme) as a basis for the organization.

The content of the advisory paper depended on the manner in which the sources were used as well as on the note-taking approach that was chosen. For participants who collected information by copying citations, the composition process consisted of modifying these citations (1, 4, 11, 24, 38, 39).

(P01#0:25:04) *"ik ga deze geselecteerde tekst in het advies plakken (…) en dan maak ik daar zometeen even een samenvattinkje van"*

["I'm going to paste this selected text into the advisory paper (…) and then I'll make a quick little summary of it there in a few minutes"]

For others, the composition process consisted of translating ideas into written text without using existing formulations (5, 7, 8, 10, 19 27, 19). These participants primarily used their prior knowledge to write the advisory papers.

(P07#1:21:39) *"ik draai ook een beetje op routine moet ik zeggen"*

["I'm depending a bit on my experience I have to say"]

For participants who copied many passages from the sources, the sources had a large influence on reading. For others, the composition process is more important. Participant 7 repeatedly wrote a part of his advisory paper on one of the task issues after which he consulted the sources for evidence to substantiate his claims. He then proceeded with the next issue. In other words, the primacy of the composition process was characteristic for his approach to the task.

4.2.5 Conclusion

The writing-from-sources process was found to be purpose-driven. The writers' purpose-driven approach resulted from a task representation that was constructed by taking notes with Notepad or iMarkup. The sources were evaluated in the light of this task representation with the purpose of collecting useful information for the advisory paper. As such, the composition process became an act of structuring and modifying the collected information that was either temporarily stored in the notes or directly copied to the advisory paper. The modifications brought the collected information in accordance with the rhetorical goals of the writer.

Participants differed in the extent to which they deemed the sources useful. This depended on their task representation: how detailed should the advisory paper be considering the needs of the Gedeputeerde as reader of the advisory paper? Prior knowledge about the field also

influenced the use of the sources: the more participants appeared to know about the task topic, the more critical they were towards the sources, and the less they used them for their advisory paper. This conclusion is in line with Stapleton (2001), who found that prior knowledge enabled students who are engaged in a writing-from-sources task to take a more critical stance towards the sources. His findings seem to be applicable to the context of our study as well.

Participants planned their writing-from-sources process based on their task representation. The task representation seemed to influence the extent to which they used the sources, when they started composing, how they organized their advisory paper, and the degree to which they took political aspects into account.

4.3 Quantitative Summary of the Processes

In the previous section, process differences were characterized qualitatively based on four components of our writing-from-sources framework. In this section, a *quantitative* description of the processes is provided. We focus on the cognitive activities that readers performed while reading and composing. To summarize these activities and their importance, we will offer a quantitative overview in this section based on the participants' verbalizations.

4.3.1 Transcription and coding of the protocols

The processes lasted, on average, 78 minutes (sd = 10 minutes). The verbalizations of the twelve cases (summarized qualitatively in Section 4.2) were transcribed, and segmented into communication units (as suggested by Hunt, 1965). Transcription of the protocols resulted in, on average, 824 communication units for each protocol, with a standard deviation of 231 units.

After transcribing and segmenting, the protocols were coded according to the activities that were performed during reading, note-taking, and composing. The coding scheme with the definitions is presented in Appendix D. The first half of one protocol and the second half of another protocol were coded by two raters (a trained student assistant and the researcher). Neither of the two protocol parts were part of the 12 selected cases. Cohen's Kappa proved to be acceptable (k=.75). Differences between the raters were discussed, resulting in agreement about which episodes had to be assigned to each of the categories. Subsequently, the twelve protocols were coded by the trained student assistant.

In the sections to follow, the distribution of the communication units over the subprocesses (reading, note-taking, and composing) are discussed, while examples of comments in each coding category will be presented.

On average, 18.4% of the communication units could not be related to cognitive activities because:

- the meaning of these communication units could not be determined (9.2%);
- they contained comments of the experimenter (4.4%), comments on the experimental situation (2.4%), or the task environment (2.4%).

Examples of units whose meaning could not be determined include phrases with empty fillers such as "ok" or "uhm" or phrases in which the participant was murmuring. Comments of the experimenter concerned prompts to resume thinking aloud, answers to questions of the participants, and prompts to fill out a card with questions on cognitive load. Apart from the

18.4%, navigation consumed on average 14.9% of the communication units. As navigation is beyond the scope of our research questions, it is not further analysed here.

In sum 33.3% of the communication units were not related to the subprocesses of writing-from-sources.

The cognitive activities were categorized according to the framework component they referred to. In Table 4.1 the totals are summarized for each framework component. These relative frequencies shed light on the role each of these components play in the total writing-from-sources process.

Table 4.1
Relative Frequency of Communication Units in Protocolss

Category	% of units	s.d.
Monitoring	12.4	3.3
Reading	20.6	6.9
Note-taking	12.3	9.0
Composing	21.3	7.9
Total	*66.7*	*6.6*

Table 4.1 shows that the model components we analyse consume, on average, 66.7% of the communication units.

Reading and composing proved to be the most important subprocesses. The standard deviations for reading underline the conclusions from the process summary that there are large differences in the degree to which the sources are used. As described in Section 4.2, these differences seem to be caused by differences in the estimated relevance of the sources.

Differences in the composition process may also be explained from this process. When participants write their advisory paper mainly by drawing on their prior knowledge without consulting the sources, this results in a higher composing percentage than when participants copy and paste from the sources. In that case, participants only modified the passages, which would require fewer communication units.

Taking notes consumed on average 12.3% of the communication units with a large standard deviation of 9%. Thus, close to one-fifth of the communication units (12.3 divided by 66.7) that was related to the model components was devoted to note-taking. Note-taking seems to be an important process within writing-from-sources. The large standard deviations, however, suggest that the importance of note-taking varies among participants. The nature of these variations is analysed in the next chapter, in which the process and purpose of taking notes is addressed.

The relative importance of the subprocesses is only a rough summary of the cognitive activities that writers performed during their writing-from-sources process. In the remainder of this section, a more specific summary is provided by distinguishing between different cognitive activities within the subprocesses.

4.3.2 Monitoring Activities

In Section 4.2, it was argued that most participants worked in a purpose-driven manner aimed at (in terms of Bereiter & Scardamalia, 1987) solving the rhetorical problem and the content problem of the writing-from-sources task.

In the verbal protocols, participants' purpose-driven behaviour could be observed in communication units related to the planning of the reading and composition process, and in units that reflected an evaluation of task progress. In our framework, these communication units are related to the Monitor as instantiation of the writer and coordinator of the process. We found a number of communication units that reflect monitoring activities. The relative frequency of these activities is shown in Table 4.2.

Table 4.2
Relative Frequency of Monitoring Activities

Category	% of units	s.d.
Interpreting the rhetorical problem	1.8	1.9
Stating present or future reading goals	4.5	2.4
Stating composing goals	4.3	2.7
Evaluating task progress	1.0	.4
Use of rhetorical and topic knowledge	.9	.9
Total	*12.4*	*3.3*

Table 4.2 shows that 1.8% of the communication units reflected interpretations of the rhetorical problem. For instance[3]:

(P19#0:59:36) *"ik denk dat eh gedeputeerde vooral wil antwoorden in de zin van dat ze het provinciaal beleid eh belicht ehm"*
["I think that uhm Gedeputeerde wants answers in the sense of that they clarify uhm provincial policy uhm"]

(P11#0:40:10) *"nou volgens mij is dit voor de gedeputeerde begrijpelijk dat ehm 't rijk er belang aan hecht dat de ecologische hoofdstructuur in 2018 gerealiseerd moet zijn"*
["Well, I think this is understandable for the Gedeputeerde that uhm the State uhm thinks it important that the Mainframe of National Landscapes has to be realised by 2018"]

(P05#0:26:39) *"dus als de groene partij het over de EHS heeft dat ik dat niet weer hoef uit te leggen in mijn advies"*
["so if the green party talks about the EHS, that I don't have to explain it again in my advisory paper"]

Their interpretation of the rhetorical situation seemed to be the basis for the formulation of reading and composing goals. Verbalizations of reading goals consumed, on average, 4.5% of the communication units. Examples include:

[3] For an explanation of the spatial planning concepts please refer to Appendix B

(P19#0:15:43) *"nu even goed kijken van wat de opdracht was"*
["now let's have a good look at what the assignment was"]

(P19#0:49:02) *"ga ik even nog na ja of dat ook geldt voor eh bossen buiten EHS"*
["I'll find out yes whether that also applies for woods outside EHS"]

(P27#0:12:22) *"even kijken of er in de toets iets staat over het huidige beleid"*
["just have a look if there's anything in the assessment about the current policy"]

Communication units that reflect composing goals consumed, on average, 4.3% of the communication units. Composing goals refer to writers' opinions about what the advisory paper should look like, and considerations about what to include and not to include in the advisory paper. The most frequently occurring type of composing goal was announcements of what the author was going to write, such as:

(P4#0:47:54) *"kijk nou moet ik eigenlijk ook nog even de vijno uitleggen"*
["look, now I should really quickly explain the vijno"]

Examples of considerations on the desired content of the advisory paper include:

(P8#0:23:19) *"mijn methode is om 't verhaal eerst te presenteren en te spiegelen aan die onderdelen die je daarin hebt gezet ja"*
["my way of working is to first present the story and to mirror the components that you have put in there yes"]

(P05#0:26:48) *"to-the-point blijven en zeggen wat er gebeuren moet om de EHS te beschermen"*
["because I have to really keep to the point and say what needs to be done to uhm protect the EHS"]

(P07#0:51:00) *"nou ik zou dat kunnen halen wel kunnen verwijzen met cijfers uit het compendium maar dat doe ik maar niet, vanwege de tijd"*
["now I could get that, I could refer to the figures from the compendium but I won't do that because of the time it'll take"]

Throughout the process, participants sometimes explicitly reflected on their progress in achieving their reading or composing goals. 'Evaluating task progress' accounted for 1.0% of the communication units. These units reflected on what was done, which issues they still had to deal with, and how much time was still available for what had to be done. For example:

(P10#0:30:14) *"eh goed dan even kijken dan is dit wat mij betreft dan hebben we even de stand van zaken"*
["Uh good, now let's have a look, then as far as I'm concerned we've got a quick picture of the state of affairs"]

(P11#1:04:43) *"ik ga eens even terug naar 't advies van wat heb ik nu en wat kan wat kan ik daar nou mee"*
["I'll just go back to the advisory paper, and see what I've got now and what I can what I can do with it"]

(P19#0:53:30) *"nou ik denk dat ik de kern nu wel heb en dan ga ik nog even terug eh voordat ehm"*
["now, I thinkI've got the core now and then I'll just go back uh, before uhm"]

Reading or composing triggered verbalizations that reflected prior knowledge and experience. Participants demonstrated their knowledge in 1% of the communication units. They elaborated and commented on what they had read with verbalizations such as:

(P38#0:11:36) *"vooral omdat het EHS-beleid natuurlijk een aantal, ja zal wel alweer een jaar of vijftien geleden zijn ingezet"*

["especially because the EHS policy of course was put into motion a number of, yes well as long ago as 15 years ago"]

(P39#0:18:46) *"nou ik weet uit ervaring dat dat niet zo is"*

["now I know from experience that that's not the case"]

(P08#0:04:33) *"we hebben zones ingesteld die breder zijn dan 't rijk"*

["we've defined zones that are broader than the State"]

Writers demonstrated a highly purpose-driven approach. This is in contrast to the pilot study, in which participants primarily took a knowledge-telling approach with a strong influence of the sources on the issues they were dealing with. The participants' larger prior knowledge of the field and their long experience within public administration (on average 17 years, see sections 3.6 and 4.4.2) may have enabled them to monitor their process based on the task's central issues.

4.3.3 Activities during Reading

Table 4.3 shows the average percentage of communication units that reflect cognitive activities related to reading.

Table 4.3
Frequency of Communication Units Related to Reading

Category	% of units	s.d.
Reading the task description	5.5	2.1
Verbalizing reading and paraphrasing	11.6	6.6
Reflecting on content of reading	3.6	2.1
Total	*20.6*	*6.9*

After the initial reading of the task description, participants frequently reread it. Reading the task description consumed, on average, 5.5% of the communication units. This figure is relatively high when compared to the 11.6% of the units that were spent on verbalizing reading and paraphrasing. The high percentage shows that much attention is devoted to reading and interpreting the task, which may be a reflection of the writers' purpose-driven approach.

Not surprisingly, the most important activity with regard to the reading process was spent on reading and paraphrasing, although there were large differences in the extent to which participants read (s.d. = 6.6). In this study the participants seemed not to be passive processors of text, but active readers who evaluated what they were reading in a purpose-driven manner. The various ways in which writers were found to evaluate the information from the sources point to the active nature of reading. This result is in line with both reading research and research on writing-from-sources, as discussed in Section 1.2.1 and Sections 1.9 respectively.

Participants were found to reflect on the sources in five different ways:

- *Reflecting on the understandability of information*
  Although most participants were familiar with the topic of the task, some participants had trouble understanding the source documents or parts of the source documents. Their protocols revealed attempts to get an understanding of the core concepts of urban and landscape planning reflected by communication units such as:

  (P11#0:34:16) *"of de doelen gehaald worden maar wie dat nou doet en hoe dat nou precies gebeurt"*
  ["whether the goals will be achieved but who's going to do that and how exactly"]

  (P4#0:29:20). *"voordat je al weet hoe precies die EHS regeling in elkaar zit ben je volgens mij al vier uur verder"*
  ["before you understand exactly how that EHS regulation works it's taken me 4 hours I reckon"]

- *Reflecting on the trustworthiness of the information*
  Participants read the sources critically. They did not accept the claims without considering whether they were true or not. Examples of communication units included:

  (P19#0:13:33) *"ja, of dat een bedreiging is, is de vraag"*
  ["yes, but whether that's a threat is another question"]

  (P18#0:36:52) *"nota ruimte is niet actueel"*
  ["nota ruimte isn't up to date"]

- *Reflecting on relevance of information*
  Participants expressed their opinion on how relevant the information was in the light of the task. Examples are:

  (P39# 0:46:22) *"ja daar schieten we allemaal niet zo erg veel mee op"*
  ["yeah, this doesn't get us very far at all"]

  (P11#0:28:20) *"en hier vind ik eigenlijk ook niet wat ik zoek eh ik voor m'n advies ehm"*
  ["and I can't really find what I'm looking for here uhm for my advisory paper uhm"]

  (P27#0:32:56) *"oke dat is een belangrijke zin die gaat over het provinciale beleid daarin"*
  ["OK that's an important sentence about the provincial policy"]

  Sometimes participants said that the sources were too detailed for the task at hand. Participant 12 stated:

  (P12#0:28:39) *"…wat ik zie in de verschillende artikelen dat zit op een dusdanig detailniveau"*
  ["what I've read in the various articles is at such a detailed level"]

  Such evaluations suggest that the participant is aware of the readers' needs (the 'Gedeputeerde').

- *Reflecting on completeness of information*
  The protocols also contained comments on the completeness of the sources. The participants primarily indicated when information was missing:

  (P19#0:10:08) *"en wat ik hier ook bij mis is ons eigen beleid"*
  ["and what I don't find here is our own policy"]

4.3.4 Activities during Note-Taking

Note-taking is the subprocess that is assumed to bridge the gap between reading and composing. Table 4.4 shows the cognitive activities related to note-taking that were found in the twelve protocols.

Table 4.4
Relative Frequency of Activities Related to Note-Taking

Category	% of units	s.d.
Planning of note-taking	1.2	1.2
Note-taking	6.3	5.4
Verbalizing note-taking	1.6	1.5
Re-reading notes	.2	.3
Reflecting on content of the notes	.2	.4
Evaluating the tools	2.9	3.5
Total	*12.3*	*9.0*

Table 4.4 shows that note-taking consumed, on average, 12.3% of the communication units. Approximately 6.3% of these units reflected the act of note-taking itself. The remaining 50% was spent on a variety of activities. The large standard deviations indicate large differences between the participants with respect to the role note-taking played during the writing-from-sources process.

Planning of note-taking primarily involved participants stating that they were about to take notes. This occurred on relatively few occasions (on average only 1.2%). Examples of communication units that reflect planning of note-taking include:

(P19#0:33:32) *"eh dan helemaal moet ik dit helemaal markeren misschien"*
["uh then I'll have to mark this whole thing then possibly"]

(P4#0:44:38) *"laat ik die in ieder geval even highlighten"*
["let me just highlight this anyway"]

Re-reading and reflecting on the content of the notes was also rare. Examples of how writers evaluated the contents of their notes are:

(P38#0:52:49) *"volgens mij ben ik niet helemaal consequent met de indeling van categorieën"*

["I don't think I've been 100% consistent in allocating my categories"]

(P1#0:07:54) *"ik heb nu even voor mezelf gehighlight waar het ehh waar het advies wat er in moet staan"*

["I've just highlighted where uhm where the advisory paper has to be put, for myself"]

Evaluations of the tool accounted for 2.9% of the communication units. These evaluations regarded the usefulness of the tool. One participant in particular frequently commented on the lack of paper, and the limited user-friendliness of iMarkup. Her comments accounted for 42% of all communication units that reflected tool evaluations. For instance:

(P19#0:14:13) *"wat ik nu mis eigenlijk is een leeg velletje waar op je je eigen kreten kunt neerzetten, dan denk ik van nou dat is een centraal punt in de eh advisering, dat moet ik nu dus eventjes op zo'n eh, op zo'n geeltje zetten"*

["what I'm actually missing at the moment is a blank sheet of paper where you can write down your own phrases, then I start thinking now that's a major point in the advisory paper, I need to get it onto a uhm one of those sticky notes"]

(P19#0:23:44) *"voor je de techniek door hebt, ben je alweer een stuk verder"*

["before you've got the hang of how the technology works, that takes up a lot of time"]

The purposes and activities of note-taking during the writing-from-sources process are discussed in Chapter 5. These functions may explain differences in the frequency with which the tool is used and differences in how the tool is appreciated. The types of communication units related to taking notes that are described here inform us about the purpose of and appreciation for the tool.

4.3.5 Activities during Composing

Most participants started composing the introduction of the advisory paper early on in the process, including the core issues they wanted to deal with. Cognitive activities related to composing consumed, on average, 21.3% of the communication units. Different cognitive activities related to composing contribute to this figure. The relative frequency of cognitive activities related to composing is shown in Table 6.4.

Table 4.5
Relative Frequency of Activities Related to Composing

Category	% of units	s.d.
Composing	7.2	4.3
Verbalizing composing	11.0	7.1
Reflecting on composition content	3.2	1.7
Total	*21.3*	*7.9*

The act of composing in itself (7.2%), and verbalisations of the composition process (11%) accounted for the main part of composing-related communication units.
In 'Reflecting on composition content' participants reflected on what they had written until that moment with expressions such as:

(P39#1:00:48) *"het is wel een woeste combinatie van allerlei aspecten en facetten"*
["it's a hefty combination of all kinds of aspects and facets"]

(P24#0:50:02) *"ja, ik zit even te kijken of er nog dingen ontbreken maar volgens mij is het nou wel redelijk eh afgerond advies"*
["yeah, I'm just looking to see if I've left anything out but I reckon it's a pretty complete advisory paper"]

Negative evaluations of (parts of) writers' own advisory papers such as in the first example constituted composing goals, since these expressions reflect what remains to be done to make the advisory paper acceptable for the participant.
In conclusion, composing the content of the advisory paper not only consists of editing the collected information, but also involves actively planning and evaluating the content of composing.

4.3.6 Conclusions

In this section the cognitive activities writers performed while reading were demonstrated by means of sample protocol fragments and the frequencies with which the various cognitive activities occurred.

Examples and percentages from the cognitive activities of reading and paraphrasing (approximately 12%), evaluation (4%), and stating reading goals (5%) show that writers were actively involved with the task and the source documents. Participants worked in a purpose-driven and evaluatory manner by interpreting and frequently rereading the task, and evaluating what they read in terms of the task they had to carry out. The relationship between taking notes and verbalizing composing suggests that the subprocesses of composing and note-taking are interwoven, with participants composing their introductions early in the process, defining reading goals based on that introduction, and composing the respective passage in the advisory paper after they had found sufficient information.

4.4 Cognitive load

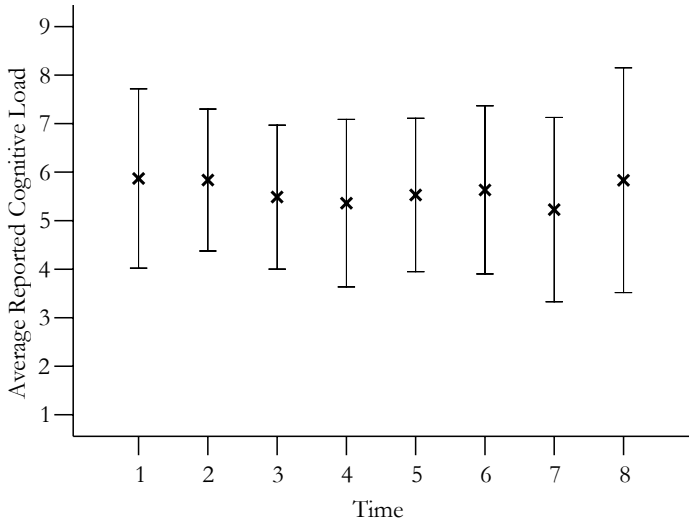
In our framework of the writing-from-sources process, we related cognitive load specifically to the process of taking notes. The Distributed Cognition perspective (Hutchins, 1995a) suggests that the use of external artefacts such as notes reduces the cognitive effort that is required for the task to be carried out. To assess the relationship between cognitive load and note-taking, we asked participants to report on the cognitive load they experienced during the writing-from-sources task. In this section we report on the cognitive load of the *task*, and the factors that are related to cognitive load. The cognitive load that the note-taking *tool* for taking notes imposed on the participants is addressed in Chapter 5.

4.4.1 Cognitive Load throughout the Process of Writing-from-Sources

To measure the cognitive load, every ten minutes the participants were asked to indicate on a nine-point scale how difficult the task was for them at that particular moment. The results are shown in Figure 4.2.

Figure 4.2 shows that participants reported moderate levels of cognitive load on the task. Standard deviations for the cognitive load of the task were moderately high (between 1.5 and 2.3). Throughout the process, cognitive load remained relatively constant with a small parabolic path: it decreased slightly towards the fourth measurement, and increased towards the end of the process. The number of cases dropped from n=34 at t6 to n=6 at t8, because towards the end of the process more and more participants had already completed their task.

Figure 4.2 Average cognitive load of the task over time



The relatively moderate levels of cognitive load suggest that participants were capable of carrying out the writing-from-sources task without approaching the limits of their cognitive resources, even though the current situation differed from how they usually approach such a task: it occurred within a completely on-screen environment. Thus, participants were able to adapt their practices to a new environment without encountering severe cognitive difficulties, even though they stated that they preferred paper, and that reading from screen was not very convenient for them. Participant 10, for instance, lacked an overview of the available information:

(P10#1:05:57) *ik mis het overzicht van informatie dus ik vind eh onhandig, als ik op mijn bureau zou werken zou ik de meest gebruikte informatie bij de hand hebben"*

["I miss an overview of information so I find it uhm impractical, if I was working at my desk I'd have the most frequently used information close at hand"]

The standard deviations (ranging from 1.5 to 2.3) point to considerable variations in cognitive load between participants. These variations could be explained by the writers' approach to the writing-from-sources task. To relate the influence of the writers' approach to the cognitive load of the task, we computed correlations between each of the activities described in Section 4.3 and the reported cognitive load of the task.

Only one significant correlation was found between activities during the writing-from-sources process and the reported cognitive load of the task. Stating reading goals proved to be significantly correlated with the cognitive load of the task ($r(12)=.63$, $p<.05$). Thus, the more the participants verbalize their approach to the task, the higher the cognitive load they reported. This is surprising, since it may be expected that stating reading goals reflects a conscious decision to follow a certain approach. A well-focused approach decreases the amount of effort that is required after the approach has been defined (revealed by, for instance, a task paraphrase in the notes or the introduction). However, the evidence we found pointed in the opposite direction than we expected.

The moderate levels of cognitive load that were reported in the previous section could be explained not only by factors related to the process of note-taking alone, but also by personal characteristics. It could be that the writers' prior knowledge and experience made the task easier for them. Therefore, in the sections to follow, the influence of *background characteristics* on cognitive load will be analysed.

4.4.2 Relationship between Prior Knowledge, Experience, and Cognitive Load

To analyse the relationship between background characteristics and cognitive load, we analysed the participants' level of experience and prior knowledge based on items from the questionnaire they filled in after the writing-from-sources task. We analysed the relationship between participants' prior knowledge and experience, and the cognitive load. In Table 4.6 the correlations between prior knowledge and experience, and the cognitive load are shown.

Table 4.6
Correlation between Prior Knowledge & Experience, Cognitive Lad and Task Duration (N=38)

	Measurement	Average cognitive load
Experience with composing advisory papers in general	Five-point scale (M=2.7, s.d.=.8)	
Experience with composing advisory papers on urban and landscape planning	Five-point scale (M=2.8, s.d.=1.1)	-.43**
Knowledge of urban and landscape planning	Five-point scale (M=3.4, s.d.=1.0)	-.42**
Years of experience in urban and landscape planning	No. of years (M=11, s.d.=8)	-.49***
Years of experience in public administration	No. of years (M=17, s.d.=9)	

Note. Only significant correlations are shown. *** correlations significant at .001 level; ** correlations significant at .01 level; * correlations significant at .05 level

Table 4.6 shows a negative relationship between the average cognitive load, and self-reported experience and knowledge of the field. Thus, the higher the prior knowledge and experience, the lower the cognitive load of the task. As such, the explanation provided for the moderate levels of cognitive load seems to hold. That is, having prior knowledge seems to make the task easier in terms of the cognitive load it imposes.

In contrast to discipline-dependent prior knowledge and experience, *general* experience within public administration and experience in composing advisory papers did not decrease the cognitive load. This underlines the importance of knowing how to 'write in the disciplines': discipline-dependent experience has a significant impact on the ease with which writing-from-sources tasks can be accomplished.

4.4.3 Conclusions

In this section the cognitive load of the task was analysed and explained by background characteristics and cognitive activities. Cognitive load proved to be moderate throughout the process. It was found that discipline-dependent prior knowledge and stating reading goals were each related to cognitive load.

Moderate levels of cognitive load suggest that sufficient cognitive resources were available for learning how to use iMarkup or Notepad to take notes. Of course, the issue of available resources is much more significant in the marker condition, in which writers could use a tool they were not yet familiar with.

Since all subprocesses of writing-from-sources draw on the same cognitive resources as taking notes, the availability of resources is an important notion when introducing a new tool that serves the purpose of facilitating the writing-from-sources process. When insufficient cognitive resources are available, the chance that writers are able to learn the interface and understand the purpose for which the tool can be used is small.

In the next chapter the cognitive load the tool itself imposed on the writers is analysed, as well as how the tool is incorporated into the practice of writing-from-sources.

4.5 Conclusions

In this chapter the process of writing-from-sources was characterized by means of a qualitative description and an overview of the cognitive activities writers performed throughout the writing-from-sources process.

The characterizations that were provided emphasize the active nature of the process. Rather than passively processing text, writers are actively engaged with the sources based on their task representation. Taking notes helped the writers to construct a task representation by highlighting the core task aspects (in the marker conditions), by writing a paraphrase of the task in Notepad (notepad conditions), or by copying the task's core aspects immediately to the advisory paper as a preliminary introductory section. As such, the mere act of taking notes helped the participants to increase their task comprehension. In educational research this beneficial effect is referred to as the encoding function of note-taking (see Section 1.3).

How writers translated the information they read from the sources to text for the advisory paper depended on the role they assigned to note-taking. Note-taking was found to serve not only and encoding function, but also an external storage function.

Information was stored by means of highlighted passages (in the marker conditions), citations that were copied to the advisory paper (in all conditions), and citations that were copied to Notepad (in the notepad condition).

When writers show such an active attitude towards the writing-from-sources task, they may benefit from tools that facilitate the evaluation of information in the light of the task participants are performing. iMarkup provides these opportunities. Users can categorize notes according to their own task categories and add evaluatory comments to the highlights. The next chapter addresses the degree to which these features are used as well as the purposes for which they are used.

Taking Notes: Purposes and Activities

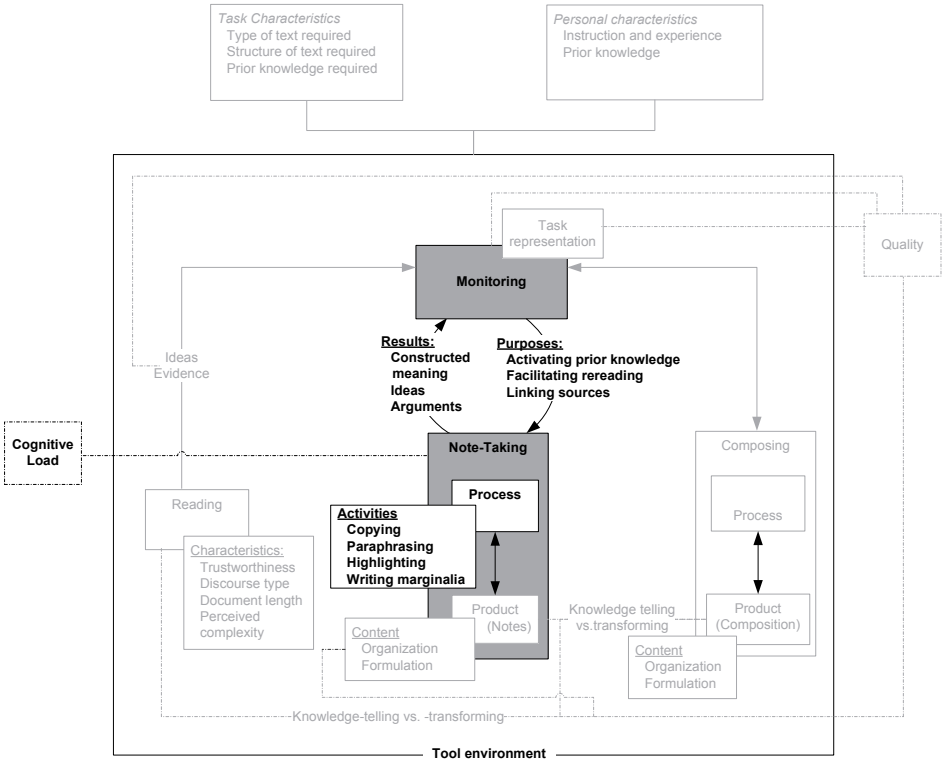
Chapter 5

5.1 Introduction

The previous chapter presented an overview of the writing-from-sources process. The described processes were examined with respect to the framework components *monitoring* and *task representation*, *reading*, *note-taking*, and *composing*. In this chapter, and the chapters to follow, the focus will be on note-taking. We will focus on the purposes of taking notes as part of the writing-from-sources *process* in this chapter. In Chapter 6 a *product* perspective is taken: the transformations from the source documents to the notes, and lastly the final advisory papers are analysed. In Chapter 7 the *effect* of taking notes *on advice quality* is analysed.

The focus of our research efforts for this chapter in the framework of the writing-from-sources process is highlighted in Figure 5.1.

Figure 5.1 Writing-from-sources framework with the Focus of Chapter 5 emphasized



As can be seen from Figure 5.1, we focus on the *activities* and *purposes* of taking notes as well as the *cognitive load* that the note-taking process generates. To examine these model components, we analyse the instances in which participants took notes throughout the process.

Activities

During the writing-from-sources process, writers make a deliberate choice between the various note-taking activities they can engage in. It is likely that they employ different activities since each of these activities can be carried out for a specific purpose. The instances in which participants engage in note-taking activities are addressed in Section 5.3.

Apart from differences in the activities writers engage in, there may also be differences in the moments at which participants take notes. Notes are the result of the cognitive activities that writers perform in the various phases of the writing-from-sources process. They may, for instance, be preceded by an evaluation of information that is read from the source documents. Previous research (discussed in Section 1.7) has already shown that writers perform different cognitive activities to a different extent in each phase of the process. Notes are the result from these cognitive activities. As cognitive activities are distributed unevenly over time, taking notes may also be unevenly distributed over time.

Therefore, we not only analyse the extent to which writers carry out certain note-taking activities, but also the distribution of note-taking instances over time. This distribution is the topic of Section 5.4.

Purposes

From the number of note-taking activities and the circumstances that lead to taking notes we can ultimately infer the purposes of taking notes during the writing-from-sources process using the notes themselves and the think-aloud protocols as primary data sources. Analyses of the think-aloud protocols shed light on the circumstances and cognitive activities that trigger the writers to take notes. By examining the protocol fragments surrounding these decisions, we can infer the purposes for which writers take notes. This analysis is presented in Section 5.5.

The same circumstances that trigger note-taking for some participants could result in other activities for other participants. To investigate whether these participants engage in different activities under the same circumstances, we analyse the protocols of those participants who take only a few notes. Analysing these protocols allows us to identify the alternative activities writers engage in where others take notes. This analysis is presented in Section 5.6.

Cognitive load

In Section 4.4 we have analysed the cognitive load the *task* imposed on the participants. In this chapter we will analyse the cognitive load of the *note-taking tool*. Even though Section 1.3 and Section 1.11 showed that note-taking can increase the quality of the final texts, the pilot study suggests that taking notes affects the quality of the advisory papers negatively, because the note-taking tool distracts the writers due to frequent switches from reading to note-taking, imposing a cognitive load on the participants.

In other words, the influence of note-taking on cognitive load has not been unequivocally established yet. Therefore, in Section 5.7 we analyse the cognitive load of the task and the tool that writers can use to take notes based on participants' self-reports.

Comparison of note-taking between conditions
The activities writers could carry out with the two note-taking tools overlap to some extent, but are different with respect to other points. The purposes for which writers engage in note-taking activities affect the use of different features of the tool, while in turn the note-taking tools shape the purposes for which the tools can be used. Therefore, to learn about the influence of the tool for all issues raised above, comparisons are made between the notepad condition and the marker condition.

Half of the participants were provided with the task's stock issues with the purpose of providing a reminder of the issues that writers should focus on. As these issues are provided through the note-taking tool, these issues may affect the extent to which, and the purposes for which, writers take notes. Therefore, comparisons are made not only between the marker and the notepad tool, but also between the conditions with and without stock issues provided.

5.2 Methodology

To investigate the purposes and activities of note-taking, we take the instances in which notes are taken as our point of focus. To re-iterate what we outlined in Section 3.8.1 in the methodology chapter, the following *activities* were counted as note-taking:

- Marking or transferring information verbatim as an intermediate step
  1) Highlighting passages (marker condition)
  2) Copying-and-pasting parts of documents to Notepad (notepad condition)
- Commenting on information
  3) Writing marginalia on sticky notes (marker condition)
  4) Adding comments to highlights (marker condition)
  5) Writing comments in Notepad (notepad condition)
- Copying-and-pasting citations to the report window (both conditions)
- Organizing notes (marker condition)

The inventory of note-taking activities is a further elaboration of what is counted as note-taking in the think-aloud protocols. We count the number of note-taking activities divided by the aforementioned types.

To answer the research questions, the number of activities themselves, as well as the cognitive operations surrounding these actions, are examined for the participants that were included in the twelve cases that were selected based on the number of note-taking activities.

5.3 Note-Taking Activities across Conditions

In this section we analyse the extent to which writers engage in note-taking activities. We address the distribution of note-taking activities across the four conditions and across features of the tool based on all 38 participants.

5.3.1 Number of Note-Taking Instances across Conditions

Before examining the purposes for which the tools' features are used, the extent to which participants take notes needs to be computed as an indication of how important taking notes was in the process of the participants.
In Table 5.1 the average number of note-taking activities is displayed divided by the four conditions. The numbers are based on all 38 participants.

Table 5.1
Average Number of Note-Taking Activities across Conditions

Condition	Without Stock Issues	With Stock Issues	Total
Notepad	10.1 (7.8)	6.3 (4.8)	*8.2 (6.6)*
Marker	31.0 (21.1)	26.3 (18.2)	*28.5 (19.3)*
Total	*20.0 (18.6)*	*15.6 (16.2)*	*17.8 (17.3)*

The marker tool was used far more often than the notepad tool ($F(1, 37)=19.00$, $p=.000$)[4]. Participants in the condition without stock issues provided engaged in the same number of note-taking activities as participants in the condition with stock issues provided ($F(1,37)=.89$;n.s.). No interaction effect between Tool and Stock issues provided was found ($F(1,37)=.02$; n.s.).

Two potential causes were identified to account for the difference in the number of note-taking instances between the notepad and the marker conditions: a difference in perceived usefulness, and a lack of affordance of the notepad.

- *Perceived usefulness of the marker*

Participants could have been more positive about the usefulness of a specific tool and, as a consequence, used it more often. They may have considered the features of iMarkup more useful than Notepad's features.

The questionnaire yielded ambiguous evidence regarding the usefulness of the tools. Participants in the marker condition indicated in the questionnaire that they wanted to keep using the tool to a larger extent ($M=3.2$; $SD=1.0$) than participants in the notepad condition ($M=2.3$; $SD=1.0$; $t(33)=-2.70$; $p<.05$). However, no significant differences were found with respect to learnability, pleasure of use, the contribution of the tool to the quality of the advisory paper, or the efficiency of the process ($-1.78 \geq t(33) \geq -.35$, n.s.).

When the desire to keep using the tool is considered a general evaluation of the usefulness of the tool, participants in the marker condition were more positive about the usefulness of the tool than participants in the notepad condition. This could explain why participants in the marker condition took more notes than participants in the notepad condition. But since the other items regarding usefulness yielded no significant results, this explanation should be treated with caution.

Participants' curiosity to discover the usefulness of iMarkup could also increase the estimated usefulness of the tool: because they spent more effort on discovering the purposes for which the tool can be used, they were more likely to have considerd the tool useful. Consequently, they would have taken notes more frequently than if they had been provided with a note-taking application that was comparable with a basic word processor.

[4] A significance level of .05 is used for all tests throughout the thesis

- *Lack of affordance of the notepad*

The notepad application and the activities it affords may also be responsible for the difference in the number of notes. Participants may have regarded the step of taking notes with Notepad as an intermediate step between reading and writing as being redundant. They could also immediately collect information from the sources (by copying or paraphrasing), and modify the information to an advisory paper without taking the intermediate step of taking notes.

The perceived redundancy of taking notes could have been influenced by usability characteristics of the notepad tool. Participants had to switch to another window in order to take notes. Using three windows (i.e. the sources, the report window, and the notes) simultaneously may have been too much for the participants. The attention shift between different windows was also found to be problematic in O'Hara et al. (2002).

However, the think-aloud protocols of the twelve selected cases provide little evidence for this explanation. Only participant 7 (without stock issues) explicitly indicated that he had trouble manoeuvring across the different windows. To avoid this complexity, he may have decided to skip taking notes as a step between reading and composing. In the end, he only took notes on one occasion.

Because the tool was in a different window, participants may have forgotten about its existence. Some participants were reminded of its availability, because every ten minutes they were asked how difficult it was to use the tool. In the think-aloud protocols, comments were found such as

(P8#0:23:11)	*"ben ik nog niet aan toegekomen. Haha"* ["haven't got around to it. Ha ha"]
(P27#0:18:06)	*"nou ik heb het nog niet gebruikt"* ["well, I haven't used it yet"]
(P27#0:36:11).	(after using iMarkup for some time) *"Ja ik heb 't nu echt een beetje ontdekt"* ["yeah, I've finally got the hang of it"]

There could to be a difference in participants' awareness of the tool's availability. In the marker condition, the demonstration of iMarkup's features lasted longer than in the notepad condition, which will increase participants' awareness of its availability. Thus it is likely that participants in the notepad condition forget about using the tool more easily than participants in the marker condition, which could in part explain the difference in the number of note-taking activities writers engaged in between the conditions.

In conclusion, the motivation to use iMarkup encouraged by a longer demonstration of the features and (though less certain) the estimated usefulness of iMarkup, seemed to contribute to the higher number of notes in the marker condition. Manipulating multiple windows may have been responsible for the smaller number of notes in the notepad condition.

5.3.2 Note-Taking Activities in the Notepad condition

Participants in the notepad condition could take notes by copying citations, or by formulating their own notes by means of Notepad.
In Table 5.2 the number of activities is summarized for both the condition with stock issues provided and without. A distinction is made between the type of note-taking activities participants could carry out.

Table 5.2
Average Number of Note-Taking Activities Subdivided by Type of Activity and Provided Stock Issues (Notepad Condition)

Type of activity	Without Stock Issues	With Stock Issues	*Total*
Copying Citations to Notepad	3.5 (6.7)	1.5 (2.6)	*2.5 (5.1)*
Writing self-Formulated notes	4.4 (4.5)	2.3 (3.5)	*3.4 (4.1)*
Total	*7.9 (8.7)*	*3.8 (4.9)*	*5.9 (7.2)*

The number of activities in which participants copied passages to Notepad proved not to be normally distributed (Kolmogorov-Smirnov $Z<1.51$; $p<.05$). In contrast, the distribution of self-formulated notes approached normal distribution (Kolmogorov-Smirnov $Z=.91$; n.s.). Consequently, for self-formulated notes a t-test had to be conducted, while for copying passages a Mann-Whitney U test was used.
With respect to copying passages, no significant differences were found between the conditions with stock issues provided and without (Mann-Whitney $U = 45.00$, n.s.). With respect to self-formulated passages, no significant differences were found between the conditions with stock issues provided and without ($t(18)=1.17$; n.s.).

In order to test whether participants in the condition without stock issues were more likely to copy citations to Notepad, or to formulate notes themselves than participants in the condition with stock issues provided, a Wilcoxon paired samples test with the two features was conducted to test whether participants conduct one of the activities more than others. No significant differences were found between each pair of different features ($-.57<Z<-.91$, n.s.).

It seems that providing stock issues to writers did not lead to significant differences in the note-taking activities writers conducted in the notepad condition.

5.3.3 Note-Taking Activities in the Marker condition

Similar to the notepad condition, the number of note-taking activities was computed, while a distinction was made between the condition with stock issues provided and without stock issues. The results are shown in Table 5.3.

Table 5.3
Average Number of Note-Taking Instances Subdivided by Activity and Provided Stock Issues (Marker Condition)

Type of activity	Without Stock Issues	With Stock Issues	*Total*
Highlighting passages	14.3 (16.5)	13.3 (8.4)	*13.8 (13.0)*
Adding comments to highlights	2.0 (4.4)	1.8 (3.9)	*1.9 (3.9)*
Writing sticky notes	6.4 (5.7)	1.8 (2.7)	*4.2 (5.0)*
Creating categories	1.1 (1.8)	.3 (.7)	*.7 (1.4)*
Assigning categories to markings	3.6 (6.3)	3.8 (8.0)	*3.7 (7.0)*
Total	*27.3 (20.4)*	*20.8 (14.7)*	*24.4 (17.7)*

Only the number of instances in which passages were highlighted, and the number of instances in which sticky notes were written proved to be normally distributed (Kolmogorov-Smirnov $Z<1.08$; n.s.). Therefore, for adding comments, creating categories, and assigning categories we used Mann-Whitney U to test for differences between the conditions with stock issues provided and without, while for sticky notes and highlighting t-tests were conducted.

Participants in the marker condition without stock issues provided wrote sticky notes more often than participants in the marker condition with stock issues provided ($t(15)=2.22$; $p<.05$).

The cognitive effort that is required to interpret the information could explain this difference. When no stock issues were provided, participants had to spend more effort to interpret the information in the light of the task, and thus are likely to write paraphrases in sticky notes, because this may help them to interpret the information.

When stock issues were provided, the participants were more aware of the specific information they were looking for, and thus could skip the step of paraphrasing information in order to interpret the information in the light of the task.

In contrast to writing sticky notes, no significant differences were found between the conditions with stock issues provided and without stock issues with respect to the frequency with which participants highlight information from the sources ($t(15)=.17$; n.s.). Providing stock issues also had little effect on the extent to which writers add comments to their highlights (Mann-Whitney $U=35.50$, $Z=-.07$, n.s.). Apparently, the process of selecting, highlighting, and commenting on information is unaffected by stock issues.

Organizing the notes under headings proved to be unaffected by whether or not participants were provided with stock issues. Both creating categories (Mann-Whitney $U=27.50$, $Z=-1.10$, n.s.) and assigning categories to markings (Mann-Whitney $U=35.00$, $Z=-.11$, n.s.) did not yield significant differences between the conditions with stock issues provided and without.

5.3.4 Copying and Pasting Citations from Sources to Report Window

Apart from using the notepad tool or the marker tool, participants could take notes by copying citations from the sources directly to the report window. As discussed in Section 3.8.1, this is considered an act of note-taking.

As writers in all conditions could copy passages immediately to their report window, we analysed whether there were differences between these conditions. Table 5.4 shows the number of instances in which participants copied passages to their report window across conditions.

Table 5.4
Average Number of Note-Taking Instances (Copying Passages from Sources to Report Window) Divided by Condition

Condition	Without stock issues	With stock issues	*Average*
Notepad	2.2 (3.5)	2.5 (2.1)	*2.4 (2.8)*
Marker	3.4 (4.1)	8.5 (3.0)	*5.8 (4.4)*
Average	*5.3 (3.6)*	*5.8 (3.7)*	*5.6 (3.6)*

A univariate analysis of variance was conducted with Tool and Provided Stock issues as the independent variables, and frequency of copying citations to the report window as dependent variable. A main effect of tool was found ($F(1, 37)=7.82$; $p<.001$). No effect of provided stock issues was found ($F(1,37)=3.84$; $p=.06$), even though a significance level of .06 points to a tendency that participants in the conditions with stock issues copied passages more frequently than participants in the condition without stock issues provided. The interaction between Tool and Provided stock issue was also non-significant ($F(1, 37)=2.86$; n.s.).

Writers' efforts to avoid usability problems could have caused participants in the marker condition to copy more passages than participants in the notepad condition. In Section 5.5 we will analyse in more detail the circumstances that trigger note-taking, including copying passages from the sources to the report window.

The relatively low mean number of instances in which citations were copied immediately to the advisory paper (and also to Notepad, see Section 5.3.2) is in contrast with the results from the pilot study, in which participants copied and pasted citations frequently. Participants' long experience in the field – as became apparent from the results of the questionnaire – may have made them more cautious in using information from the sources verbatim. Their experience may have enabled them to maintain a more critical stance towards the source texts and thus to be more selective in what to include in the advisory paper without adaptation to the current rhetorical situation.

5.3.5 Conclusions

In this section differences in taking notes between the tools and between features of the tools were brought into the limelight. The results show a motivation to use iMarkup, possibly based on the estimated usefulness for the writing-from-sources process. The results also show that the features that are offered by iMarkup do not suffice to fully support the writing-from-

sources process. Participants demonstrated a need for free space to take notes that are not related to specific passages. Compensation was sought by writing on sticky notes, or by copying passages to the report window.

In Section 1.3 we discussed the beneficial effects of note-taking in terms of the encoding and the external storage function. For participants in the notepad condition, it seems that the encoding function of note-taking prevails over the external storage function. Notepad was primarily used during reading and interpreting the task description. By engaging in note-taking activities participants improved their understanding of the task. This beneficial effect is in education mutatis mutandis referred to as the encoding function of note-taking.
The tool was used far less often to store paraphrases or copied citations from the documents. The benefits that can be gained from this activity are referred to as the external storage function.

It could be that writers perceived the additional step of taking notes with Notepad while reading as redundant. This perceived redundancy of taking notes with Notepad combined with the distribution of attention across multiple windows seemed to result in a limited use of the notepad application.

5.4 Note-Taking Activities over Time

In Section 5.3 the extent to which writers take notes was analysed. But participants may be expected not take notes to the same extent throughout the process. When participants start reading, a higher number of note-taking instances may be expected. Towards the end of the process, when participants finish their advisory papers and are engaged in composing, the number of notes may be lower. In this section the distribution of taking notes over time is discussed. The analysis will be based on the writing-from-sources processes of all 38 participants.

5.4.1 Differences between the Four Conditions

In this section we try to answer the question whether writers take notes to the same extent throughout the process. Considering reading the task description as the start of the process, we divided the processes into periods of 10% of the total process length. Hereafter, these 10%-groups in time are referred to as *phases*. In Table 5.5 the distribution of note-taking activities over these phases is shown.

Table 5.5
Average Number of Note-Taking Instances Distributed over Time Divided by Condition

	1	2	3	4	5	6	7	8	9	10
				Notepad condition (N=20)						
Without stock issues										
Percentage	41	15	11	15	5	6	3	3		
Average	*3.6*	*1.6*	*1.4*	*1.5*	*.6*	*.5*	*.3*	*.3*		
S.D.	*2.6*	*1.6*	*2.1*	*2.0*	*.7*	*.7*	*.7*	*.7*		

Table 5.5 (*Continued*)

	1	2	3	4	5	6	7	8	9	10
With stock issues										
Percentage	22	17	9	25	7	5	7	5	2	2
Average	*1.3*	*.5*	*.6*	*1.4*	*.7*	*.5*	*.6*	*.4*	*.2*	*.1*
S.D.	*1.6*	*.7*	*1.0*	*1.4*	*1.3*	*1.1*	*1.0*	*1.0*	*.4*	*.3*
				Marker condition (N=18)						
Without stock issues										
Percentage	15	23	16	14	14	7	6		4	
Average	*4.3*	*6.9*	*4.6*	*3.2*	*4.2*	*2.0*	*2.4*	*.1*	*.6*	
S.D.	*4.6*	*5.5*	*4.1*	*2.9*	*2.2*	*3.0*	*5.9*	*.3*	*1.0*	
With stock issues										
Percentage	11	24	17	14	8	10	4	5	6	3
Average	*2.8*	*6.3*	*4.3*	*3.6*	*2.0*	*2.4*	*1.1*	*1.2*	*1.6*	*.8*
S.D.	*3.3*	*4.7*	*3.4*	*4.2*	*2.2*	*2.6*	*1.3*	*2.2*	*3.0*	*1.0*

Note. Figures represent percentages of total number of notes

In general, across conditions the number of notes seemed to drop over time. Most notes were taken in the first phases of the process while participants read the task description. As we have described in the previous chapter (Section 4.2.3), note-taking plays an important role while reading the task description as it facilitates task comprehension in both the marker condition and the notepad condition. After the fourth phase, the number of notes dropped considerably, although to a larger extent in the notepad condition than in the marker condition.

To test whether the tool and the provided stock issues affect how taking notes is distributed over time, a repeated measures analysis was conducted with Tool and Provided stock issues as fixed factors.

A multivariate effect of Phases ($F=7.80$; $df=9$; $p<.001$) was found as well as an interaction between Phases and Tool ($F=2.55$; $df=9$; $p<.05$). The same within-subjects effects were found: an effect of phases ($F=10.44$; $df=4.99$; $p<.001$) and a Phases x Tool interaction ($F=4.56$; $df=4.99$; $p<.01$). In other words, note-taking activities are significantly affected by the phase of the process. Furthermore, the distribution of note-taking activities over the phases is different for the notepad and the marker condition.

The interaction effect between Phases and Provided stock issues (F=1.21; df=4.99; n.s.) and the Phases x Tool x Provided stock issues effect (F=.57; df=4.99; n.s.) were not significant.

As became apparent in Section 5.4, a between-subjects effect of Tool was found: participants in the marker condition took significantly more notes than participants in the notepad condition (F(1, 37)=18.35; p<.001). No between-subjects effects of Provided stock issues was found (F(1, 37)=.43; n.s.). The interaction effect of Tool x Provided stock issues was also not significant (F(1, 37)=.02; n.s.).

To summarize, the number of notes is significantly related to the phase in the process as well as to the tool that is used. Not only were more notes taken in the marker condition, but participants in the marker conditions also took notes in different phases of the process than participants in the notepad condition.

Differences in how notes are distributed over time indicate that participants do not take notes at random, but take notes as the result of conscious decisions depending on the phase in the process participants are engaged in. The precise nature of differences in when the tools are used is addressed in the next section, where, in contrast to this analysis, a distinction is made between the specific note-taking activities that are supported by the tools participants use: It may be that different features are used in different phases of the process, depending on the objective a participant wants to achieve.

5.4.2 Note-Taking Activities in the Notepad Condition Distributed over Time

In the notepad condition, participants could copy passages from the sources to their Notepad, or they could formulate their notes themselves. The distribution of these activities over time is displayed in Table 5.6.

Table 5.6
Percentage of Note-Taking Activities Distributed over Time Divided by Condition (Notepad condition)

	1	2	3	4	5	6	7	8	9	10
				Without stock issues provided (N=10)						
Copying passages	20	20	17	26	11	6				
Writing self-formulated notes	63	15	12	10						
				With stock issues provided (N=10)						
Copied passages	7		13	33	27	7	7	7		
Writing self-formulated notes	30	13	9	9	4	9	13	9	4	

Note. Figures represent total number of notes of a particular type

Because of the small number of participants, Chi-square tests were conducted to see whether the distribution of notes in the notepad condition deviates from the expected distribution. We make a distinction between participants in the condition with stock issues provided and without stock issues provided.

For the condition without stock issues provided, the distribution deviates from the expected distribution ($X^2(14)=48.88$; $p=.000$), suggesting differences between conditions. Examining the tables shows that participants in the condition with stock issues took notes throughout the process in a more evenly distributed way, whereas note-taking in the condition without stock issues was more skewed, with a peak in the number of notes at the beginning of the process that declined over time. In the notepad condition, participants formulated notes themselves only in the first phases of the process, whereas participants in the condition with stock issues provided formulated their own notes throughout the process.

As we argued in Chapter 4.2.3, in the first phases of the process, participants' notes primarily consist of task paraphrases. As such, paraphrasing the task through writing enhances participant's comprehension of the task, which explains the high percentage of self-formulated notes in the early phases of the process.

5.4.3 Note-Taking Activities in the Marker Condition Distributed over Time

In the marker condition, participants could engage in various note-taking activities using iMarkup. We investigated which activities participants engaged in during the phases of the process. The results are shown in Table 5.7.

Based on the general analysis in the previous section, it may be expected that the distribution of note-taking activities differs depending on the tool and the phase in the process. This proved to be the case (X^2 ($df=40$)$=96.6$, $p=.000$). However, this analysis provides little information concerning the phases in which the distribution differs.

First, due to a non-normal distribution (Kolmogorov-Smirnov $Z > 1.41$; $p<.04$) Mann-Whitney U tests were computed to test whether participants in the condition with stock issues provided took a different percentage of their notes in a particular phase than participants in the condition without stock issues provided. This proved not to be the case (Mann-Whitney $U>11$, n.s.), except for highlighting in the fifth phase of the process (Mann-Whitney $U=1.00$, $p=.05$). In that particular phase, participants in the condition without stock issues provided took a significantly larger share of the markings than participants in the condition with stock issues provided.

Table 5.7
Percentage of Note-Taking Instances Distributed over Time Divided by Condition (Marker Condition)

	1	2	3	4	5	6	7	8	9	10
					Without stock issues provided (N=9)					
Highlights	16	30	20	10	11*	5	9		1	
Added comments		28	6	11	6	11	33		6	
Sticky notes	21	24	21	21	10	3				
Creating categories	40	10	10		40					
Assigning categories	6	15	9		39	9	18		3	

Table 5.7 (*Continued*)

	1	2	3	4	5	6	7	8	9	10
				With stock issues provided (N=9)						
Highlights	17	37	14	11	6*	6	4	3	2	1
Added comments	29	21	29	14			7			
Sticky notes	7	36	14	21		7	7	7		
Creating categories			100							
Assigning categories		20	10	23	7	10	7	7	13	

Note. Figures represent percentages of total number of note-taking instances. Significant differences are flagged with a *

5.4.4 Use of Copied Citations from Sources to Report Window across Conditions

Participants in both conditions could copy passages from the sources to their report window. In this section the distribution of copied passages over the different phases of the process is analysed. We computed the average numbers of copied citations for each phase in the process subdivided by Tool and Provided stock issues. The results are shown in Table 5.8.

Table 5.8
Average Number of Note-Taking Instances (Copied Citations) Over Time Divided by Conditions

	1	2	3	4	5	6	7	8	9	10
				Notepad condition (N=20)						
Without stock issues	3.6	1.6	1.4	1.5	.6	.5	.3	.3		
S.D.	*2.6*	*1.6*	*2.0*	*2.0*	*.7*	*.7*	*.7*	*.7*		
With stock issues	1.3	.5	.6	1.4	.7	.5	.6	.4	.2	.1
S.D.	*1.6*	*.7*	*1.0*	*1.4*	*1.3*	*1.1*	*1.0*	*1.0*	*.4*	*.3*
				Marker condition (N=18)						
Without stock issues	4.3	6.9	4.6	3.2	4.2	2.0	2.4	.1	.6	
S.D.	*4.6*	*5.5*	*4.1*	*2.8*	*6.2*	*2.6*	*1.3*	*2.2*	*3.0*	*1.0*
With stock issues	2.8	6.3	4.3	3.4	2.0	2.4	1.1	1.2	1.6	.7
S.D.	*3.3*	*4.7*	*3.4*	*4.2*	*2.2*	*2.6*	*1.3*	*2.2*	*3.0*	*1.0*

We tested whether copying passages was distributed unevenly over the phases and whether this distribution was affected by the tool participants could use and by the provided stock issues. We found a multivariate effect of phases ($F=7.80$; $df=9$; $p<.001$), and a Phases x Tool interaction ($F=2.55$; $df=9$; $p<.05$). A within-subject effect of Phases ($F=10.44$, $df=.5.01$; $p<.001$) was found, as well as a Phases x Tool interaction ($F=4.56$; $df=5.01$; $p<.01$). Other effects were not significant.

In sum, the number of copied passages was significantly affected by the tool participants used to take notes as well as by the moment in the process. The number of copied passages is higher for the participants who used iMarkup than for participants who used Notepad. In general, the number of copied passages declined over time. This can be explained since some participants improved their understanding of the task by reading and copying passages from the task description. The copied parts of the task description constituted the introduction of the advisory paper – possibly after slight modifications. This approach could explain the peak number of instances in which passages were copied from the sources early in the process.

5.4.5 Conclusions

Across conditions, participants took more notes in the early phases of the process than in the later phases, which reconfirms our observations from our qualitative analysis in Chapter 4 (See section 4.2.3). A peak number of notes was found in the early phases of the process during which the participants seem to be trying to get an understanding of the task.

Notepad is primarily used to improve task comprehension, whereas the storage of information plays only a minor role. In contrast, although the peak number of notes occurs in an early phase of the process, in the marker condition participants continued to take notes throughout the process.

In early phases of the process, participants construct a task representation that helps them to plan their process. After that, participants evaluate the sources and collect information from them by means of taking notes. Later in the process, they compose their advisory paper. In each phase, they consciously decide on the purposes they could use the tools for.

5.5 Triggers and Purposes of Note-Taking

In the previous sections, a quantitative analysis was provided of the note-taking process that was based on the *number of note-taking activities*. These results are informative in terms of the relative importance of note-taking throughout the writing-from-sources process, but are less informative in terms of the conditions in the writing-from-sources process that *trigger* note-taking. These triggers of note-taking are addressed in this section based on the twelve selected think-aloud protocols.

5.5.1 Notes Triggered by Reading the Task Description

As discussed in Section 4.2.3, participants frequently took notes when they were reading the task description. In both the notepad condition and the marker condition, taking notes helped writers to improve their understanding of the task.

Notepad condition

In the notepad condition, participants took notes from the task description in two ways: by copying parts from the task description, or by paraphrasing it. The purpose of both approaches was to increase their task comprehension. An example is provided in Citation 5.1.

Citation 5.1
Example of 'Notes Triggered by Reading the Task Description' by copying

1	**Navigates to** *Taakomschrijving*	**Navigates to** *Task description*
2	Ehm oke wrrrrp	um OK wrrp
3	Dit was het kladblok he ja	So this was the notepad yes
4	**Activates Notepad**	**Activates Notepad**
5	Dan ga ik 't eens even ehm	Then I'll start um writing for myself, or a
6	opschrijven voor mezelf van eh of	quick copy and paste, uh what was the
7	even knippen en plakken eh wat nou	question again exactly
8	precies de vraagstelling was	
9	**Navigates to** *Taakomschrijving*	**Navigates to** *Task Description*
10	*Silence 15 sec.*	*Silence 15 sec.*
11	Motorisch zit ik niet helemaal goed in	My movements aren't very coordinated
12	m'n vel vandaag	today
13	Ik kan de muis niet goed bedienen	I can't get the mouse to work properly
14	**Copies** *Taakomschrijving*	**Copies** *Task Description*
15	*Silence 11 sec*	*Silence 11 sec*
16	**Activates Notepad**	**Activates Notepad**
17	**Pastes** *Taakomschrijving*	**Pastes** *Task description*
18	**Navigates to** *Taakomschrijving*	**Navigates to** *Task description*
19	Oke ik heb het gelezen en eh	OK.I've read it now and uh
20	*[Experimenter]* Ga je gang zou ik	*[Experimenter]* I'd just get on with it if I
21	zeggen	were you
22	En het advies eh dat moet ik dat	And the advisory paper, uh I'll have to, I'll
23	moet ik daar weer in eh	have to put it in there uh

(P11#0:15:28-0:16:34)

In this example the participant tried to discover which questions he had to answer (line 5-7[5]). To do so, after remaining silent for a while he copied the task description and pasted it to Notepad. By stating that he had read it, he seemed to indicate that he had understood what was expected from him. Following on this fragment he started to compose the introductory section of his advisory paper. Copying the task description in this case resulted in an improved comprehension of the task, whose final outcome was the introductory section of the advisory paper.

Some participants did not copy and paste parts from the task description to Notepad, but paraphrased them. As an example, in Citation 5.2 a fragment from participant 39's protocol is shown.

After reading the task description, the participant concluded that two things were being asked (line 1). These issues were subsequently paraphrased in Notepad. The reordering of the task issues as announced in line 15 was the first step in writing a table of contents for the advisory paper, a step the participant took following on on this fragment. In two steps the task description was reduced to a table of contents for the advisory paper. First the task was paraphrased in Notepad. Then a table of contents was distilled from this paraphrase.

[5] In referring to citations, we will refer to the lines associated with the English translation

Citation 5.2
Reading the Task Description as Trigger for Taking notes (Notepad Condition)

1	Oke dus ze vragen twee dingen	OK, so they're asking for two things
2	*Silence 8 sec.*	*Silence 8 sec.*
3	Kladblok	notepad
4	**Writes '***Gevraagd: - welke gevolgen*	**Writes** *´Question - what effects does the*
5	*heeft rijksbeleid'*	*government policy have'*
6	Gevraagd ehm welke gevolgen heeft	Question um what effects does the state
7	rijksbeleid	policy have'
8	*Silence 5 sec.*	*Silence 5 sec.*
9	(...)	(...)
10	**Navigates to** *Taakomschrijving*	**Navigates to** *Task description*
11	Besteed in uw advies aandacht aan	In your advisory report pay attention to
13	zaken als het huidige beleid	affairs such as the current policy
14	*Silence 7 sec.*	*Silence 7 sec.*
15	**Activates Notepad**	**Activates Notepad**
16	Even ordenen	Let's sort these out quickly
17	**Writes** *'Huidig beleid'*	**Writes** *´Current policy´*
18	*Silence 10 sec.*	*Silence 10 sec.*
19	Uw advies	Your advisory paper
20	Ehm nee wacht even	Uhm, no just a minute

(P11#0:15:28-0:16:34)

Marker condition
In the marker condition, the task description was the document that triggered the largest number of note-taking activities. Most participants simultaneously read the task description and took notes on it. Taking notes on the task description served the same purpose as in the notepad condition: it contributed to participants' task comprehension. An example of this is provided in Citation 5.3.

Citation 5.3
Reading the Task Description as Trigger for Taking Notes (Marker Condition)

1	Het Groen Links vraag dus	So, the Green party question
2	**Highlights** *'wat de gevolgen zijn van*	**Highlights** *´what the effect are of these*
3	*deze maatregelen voor de*	*measures for the quality of nature´*
4	*natuurkwaliteit'*	
5	Die zullen dus eh vooral voor de	So they're um especially looking for an
6	natuurkwaliteit een antwoord willen	answer for the quality of nature
7	hebben	
8	Deze een antwoord willen hebben,	This, looking for an answer, these
9	deze maatregelen	measures
10	**Highlights** *'welke maatregelen*	**Highlights** *'which measures can be taken*
11	*genomen kunnen worden om de*	*to stimulate the realization of these policy*
12	*realisatie van de beleidsdoelstel-*	*goals'*
13	*lingen te bevorderen'*	
14	Wat de consequenties zijn	What the consequences are
15	Ja consequenties moet er ook bij	Yes, consequences have to be in there too

(P4#0:18:13-0:18:58)

Interpretations of the task and of the rhetorical situation (line 1, 5-6) were alternated with highlights. These interpretations can be seen as arguments for making a note. The highlights formed the basis for the sticky notes on which the participants wrote out the structure of her advisory paper. Thus, the highlights were in fact a pre-selection of relevant parts of the task description.

Copying Passages from the Sources to the Report Window
Apart from taking notes on the task description using Notepad or iMarkup, writers improved their understanding of the task by copying passages from the task description immediately to the report window. These copied parts not only contributed to participants' understanding of the task, but they also formed the basis for the introduction of the advisory paper. In such an approach, the additional step of taking notes with Notepad or iMarkup is skipped.

For instance, participant 10 copied phrases of limited length to the advisory paper. He reformulated these phrases into questions that had to be answered. He explained his approach with the following remark:

(P10#0:13:07) "Ik haal even een paar eh elementen uit die eh de vraagstelling eh over op mijn advies, dan kan ik daar zo bij aansluiten straks"
[*"I'll take a couple of eh elements from the question eh and put it in my report, then I can come back to it later"*]

After writing out the introduction, he went back to reread what exactly the Gedeputeerde expected from him:

(P10#0:15:38) Dan ga ik even terug eh naar wat mijn gedeputeerde vervolgens van mij vraagt"
[*"Then I'll go back uh to what my Gedeputeerde wants from me after that"*]

Conclusion
In these examples the participants took notes from the task description (verbatim or paraphrased) and then subsequently used these notes to prepare a part of the advisory paper. Following McGinley (1992), this could be referred to as an intermediate step from reading to writing.

5.5.2 Notes Triggered by the Approach of Tentatively Selecting Information

Participants wanted to select and store potentially useful information for their advisory paper. Later on in the process this information was summarized and modified to fit the needs of the advisory paper's reader. By selecting, evaluating and storing information, writers prepare themselves for writing the advisory paper.

Marker condition
Only participants in the marker condition demonstrated an approach of tentatively selecting information from the sources. Prior to taking notes with the marker, they indicated that information was relevant or useful for the advisory paper. These evaluations often resulted in a note. An example is provided in Citation 5.4:

Citation 5.4
Example of 'Markings as Outcome of Reading Task-Related Information'

1	ik moet kijken...huidig beleid ten	I'll have to look…current policy
2	aanzien van de EHS	regarding the EHS
3	(...)	(…)
4	dan moet ik kijken bij	then I'll have to go back to nature
5	natuurgebieden	reserves
6	*Silence 6 sec.*	*Silence 6 sec.*
7	hier staat het doel van de EHS	here's the goal of the EHS
8	okee dus dan ga ik hier even een	OK so then I'll make a quick highlight
9	highlight maken	here
10	**Highlights passage** *'De provincies*	**Highlights passage** *'The provinces*
11	*geven via gebiedsplannen aan welke*	*specify via nature reserve plans*
12	*gebieden precies de EHS vormen(…)*	*exactly which areas make up the EHS*
13	*zekere mate van versnippering van*	*(…) certain degree of fragmentation'*
14	*natuurgebieden.'*	
15	oh dat is ook goed	oh, that's OK too
16	en dan wil ik er tekst bij	and then I'll need some text
17	**Adds text** *'Doel van de EHS'*	**Adds text** *'Goal of the EHS'*
18	**Assigns category** *'huidig beleid'*	**Assigns category** *'current policy'*

(P4#0:09:27-0:10:17)

In line 1-2 the participant formulated a reading goal. This reading goal was the result of a task interpretation. In line 4-5 this reading goal was mapped onto the navigational structure of the available information. She then found the information she thought that was needed for that theme, interpreted it as the goal of the EHS, and announced that she was going to highlight that passage (line 8-9). Subsequently, she highlighted that passage (line 10-13), added her interpretation of that information to the highlight (line 17), and categorized it as a marking that belonged to the issue of current policy (line 18).

The process thus involved four steps: goal setting, navigation, evaluation, and note-taking. The resulting note that was categorized according to one of the task's issues could be used for the advisory paper later on in the process.

Apart from reading information that could be related to the task's core issues, reading information on new issues that the participant was not aware of at the time leads to a similar process of goal setting, evaluation, and note-taking. An example from the same process is given in Citation 5.5.

Citation 5.5
Example of 'Markings following on extension of the task representation

1	**Navigates to** *'realisatie nieuwe*	**Navigates to** *'realization new*
2	*natuur'*	*nature'*
3	Realisatie is ook handig	realization is also useful
4	*Silence 6 sec*	*Silence 6 sec.*
5	om daar iets in op te nemen	to write something there about that
6	(...)	(...)
7	**Highlights passage**	**Highlights passage**
8	**Adds text 'realisatie EHS'**	**Adds text 'realization EHS'**
9	nou dan wil ik natuurlijk ook nog	now then of course I want to know
10	weten hoe dat in Utrecht is te	how that can be realized in Utrecht
11	realiseren	
12	realisatie van de EHS, of onze	realization of the EHS, whether our
13	provincie daar al iets aan doet	province is already doing something
14		about it

(P4#0:18:13-0:18:58)

By reading information on an issue that was not yet part of her task representation (line 1-2), she concluded that 'Realisation' was a topic that was worth including (line 3 and 5). The topic of 'Realisation' became a new composition goal. Following that decision, she highlighted a passage, and paraphrased it as 'realisation EHS (line 7-8). By doing this, she was actually preparing the content for the advisory paper.

After these note-taking activities, she formulated a reading goal: she wanted to know how her province was doing with respect to the EHS (line 9-10). In that sense, the highlighted and paraphrased passage created a more specific reading goal.

Copying passages from the sources to the report window

Whereas pre-selecting information by taking notes occurred only in the marker condition, in all conditions some participants demonstrated the approach of pre-selecting information by copying passages from the sources directly to the advisory paper.

For instance, participant 1 (marker condition with stock issues provided) preferred copying a passage rather than highlighting and then copying, because no additional steps were necessary (*"ik kan 'm ook wel gelijk gaan kopiëren… in gaan plakken"* ["Well, I could also copy it right now… and paste it"], P1#0:40:34). Thus, he considered highl-ighting to be redundant, and as a result chose to copy the passage immediately to the advisory paper. An example of his approach is provided in Citation 5.6, which is displayed on the next page.

In this example a passage is copied and pasted with the intention of summarizing it later on (line 9-10). As such the copied citation is a pre-selection of useful information for the advisory paper. After copying, the participant monitored his progress by indicating that he had finished the first part of his advisory paper, containing the current policy. After this fragment, the participant copied and pasted a passage once more. Then again he said that he had finished that part of his advisory paper. A similar approach of evaluating, copying, and modifying passages was found for participants in the notepad condition.

Citation 5.6
Example of 'Copying passages as pre-selection of potentially useful information'

1	**Navigates to** *'Toets Vijfde Nota'*	**Navigates to** *'Ássessment Fifth Memorandum'*
2		
3	*Silence 5 sec.*	*Silence 5 sec.*
4	**Copies passage from** *'Toets Vijfde*	**Copies passage from** *'Ássessment*
5	*Nota'*	*Fifth Memorandum'*
6	(…)	(…)
7	Ik ga deze selecteerde tekst in het	I'll just paste this selected text in the
8	advies plakken	report
9	**Activates report window**	**Activates report window**
10	En dan maak ik daar zometeen even	And then I'll make a summary of it
11	een samenvattinkje van	there in a minute
12	**Pastes passage from** *'Toets Vijfde*	**Pastes passage from** *'Ássessment*
13	*Nota'*	*Fifth Memorandum'*
14	(…)	(…)
15	En dan heb ik het eerste onderdeel	And then I've got the first part of the
16	huidig beleid uitgewerkt	current policy worked out
17	**Navigates to** *'Toets Vijfde Nota'*	**Navigates to** *'Assessment Fifth*
18		*Memorandum'*

(P1#0:24:55-0:25:13)

In this section an approach of tentatively selecting information was found for participants in the notepad condition and participants in the marker condition when citations are copied and pasted from the sources to the advisory paper. In addition, some participants in the marker condition proved to highlight information as an intermediate step before incorporating part of the highlighted information in the advisory paper.

From this approach, it may be concluded that offering a tool that features highlighting affords taking an approach of tentatively selecting, evaluating, and highlighting information before incorporating it in the advisory paper (by copying the highlights or by paraphrasing).

5.5.3 Notes Triggered by Usability Problems

Participants sometimes experienced usability problems that made them decide to take a certain approach to note-taking. In the notepad condition, two participants preferred using Notepad over the report window to compose their advisory paper.

In the marker condition, sticky notes were used to compensate for a lack of free note-taking space. Copying passages from the sources directly to the advisory paper was not triggered by participants experiencing usability problems.

Notepad condition

Not only considerations that relate to the writing-from-sources process itself made participants take notes, but also participants' efforts to avoid usability problems. An example is provided in Citation 5.7.

Citation 5.7
Example of 'Taking Notes Triggered by Usability Considerations' (Notepad Condition)

1	Weet je wat ik ga eventjes naar dat	Know what? I'll just go to that
2	kladblok want daar kan ik meer tekst op	notepad because I can get more text
3	kwijt volgens mij.	in there I reckon.
4	Dan maak ik het iets overzichtelijker	Then I can give it a bit more
5		structure.
6	Even een leermoment	That was a learning moment
7	Notepad gebruik op dit moment	Notepad I'm using at the moment
8	**Cuts introductory section from report**	**Cuts introductory section from**
9	**window**	**report window**
10	*Silence 4 sec.*	*Silence 4 sec.*
11	ja ik heb 't nu echt een beetje ontdekt	Yeah, I've finally got the hang of it
12	ehm	uhm
13	**Activates Notepad**	**Activates Notepad**
14	**Pastes introductory section to**	**Pastes introductory section to**
15	**Notepad**	**Notepad**
16	Yes das inderdaad handig	Yes that really is handy

(P27#0:35:55-0:36:25)

After half an hour, participant 27 discovered that it was more efficient to use Notepad to compose his advisory paper than use the report window, because more space was available in Notepad (line 1-3). A larger window improved the overview over his text (line 4-5), which he considered convenient after trying it out once (line 16). The remainder of his advisory paper was composed in Notepad. Thus taking notes on Notepad was the result of a usability consideration.

Although he did not verbalise an explicit decision to start using Notepad for the advisory paper, participant 39 followed a comparable approach. He started by paraphrasing the task and writing a table of contents in Notepad. His notes eventually evolved into an advisory paper through paraphrasing and modifying parts from the source documents. When he was almost finished, he copied and pasted his notes into the report window. He then submitted his advisory paper.

Composing on screen is thus made more complicated by the limited space that is available. These participants seek to maximize their working space by using Notepad instead of the proposed report window.

Marker condition

Sometimes participants expressed that they wanted to use a blank window to take notes in order to outline the structure of the advisory paper or to store paraphrases. As such an empty window is not available within iMarkup, participants sought to compensate for the lack of this feature by using sticky notes. An example is provided in Citation 5.8.

To solve the problem of lack of space for taking notes (line 1-5), participant 19 decided to use sticky notes. Her relatively limited ICT skills prevented her from using these sticky notes effectively as she experienced substantial trouble in manipulating their size and position. She was aware that they were not related to the neighbouring text (line 8-10). This remark indicates an awareness of which function these sticky notes usually serve.

Citation 5.8
Example of 'Taking Notes Triggered by Usability Considerations' (Marker Condition)

1	Wat ik nu mis eigenlijk is een leeg	What I need is a blank piece of
2	velletje waarop je je eigen kreten neer	paper so I can write down some of
3	kunt zetten dan denk ik van nou dat is	my own phrases then I think now
4	een centraal punt in de eh advisering,	that's a key point in the uh report,
5	dat moet ik dus nu eventje eh op zo'n	so I'll have to now quickly uh, write
6	eh, op zo'n geeltje zetten	it on that sticky
7	**Activates task description**	**Activates task description**
8	dat heeft dan helemaal geen relatie met	That's got absolutely nothing to do
9	de tekst, maar ik zal toch even zo'n geeltje hier plakken	with the text, but I'll just put that sticky here

(P19#0:14:13-0:14:40)

A similar use of sticky notes was found in the process of participant 5 who only took notes on a very limited scale. Apart from three copied citations, he created two sticky notes in order to restructure his advisory paper:

(P5#0:48:15) *"Ik denk dat ik zo'n beetje moet proberen wat ordening in de zaak in 't advies aan te brengen. En nou kan misschien de sticky notes van belang van toepassing zijn"*
["I think I'll need to structure the whole thing the report a bit. And maybe the sticky notes can be important, useful here."]

For both participants, the sticky notes, that were meant to contain remarks that were related to the neighbouring text, were used to compensate for a lack of empty space for structuring thoughts about the contents and organization of the advisory paper.

5.5.4 Notes Triggered by Experimental Events

In both the notepad condition and the marker condition, note-taking activities were triggered by the cognitive load questions. Not all participants were aware that a note-taking tool was available throughout the entire process. Remarks made by the experimenter occasionally prompted the participants to remember that the tool was available.

Notepad condition
In the notepad condition, participant 27 was reminded of Notepad's availability, which seemed to lead to note-taking. In Citation 5.9 the trigger to participant 27's note-taking activities are shown.

In this case, the participant was confused about the windows he had to use for his notes and for his advisory paper. The experimenter's remarks about where the Notepad window was may have caused the participant to write the notes (a partial task paraphrase) in line 15-17.

Citation 5.9
Example of 'Taking Notes Triggered by Experimental Events' (notepad condition)

1	Ik kan hier wel steeds weer terug naar	I can keep coming back to that
2	dat laatste	last
3	*[Experimenter]* Ja	*[Experimenter]* Yes
4	(...)	(...)
5	Eens even kijken eh ik kan naar eh	Let's just see uh I can go to uh
6	*[Experimenter]* Euhm, dat venster	*[Experimenter]* Uh, that window
7	Het kladblok	the notepad
8	*[Experimenter]* Daar kunt u	*[Experimenter]* You can make
9	aantekeningen maken en in dit venster	notes there and in this window
10	kunt u 't advies uitschrijven	you can write out your report
11	Oke	OK
12	**Activates Notepad**	**Activates Notepad**
13	*Silence 7 sec.*	*Silence 7 sec.*
14	Het moet dus eh bestaande	So it has to be uh existing
15	**Writes** *'bestaande beleid kort*	**Writes** *'current policy describe*
16	*weergeven consequenties scenario*	*briefly consequences scenario*
17	*160.000 ha rode functies'*	*160,000 acres red functions'*
18	*Silence 4 sec*	*Silence 4 sec*
19	Beleid kort weergeven	Describe policy briefly

(P27#0:35:55-0:36:25)

Marker condition

Every ten minutes participants were asked to report on the difficulty they were experiencing with the writing-from-sources task and the use of the note-taking tool. These questions occasionally reminded them of the tool's availability. An example is provided in Citation 5.10.

Citation 5.10
Taking Notes Triggered by Experimental Events (Marker condition)

1	Oh ja ik heb er eigenlijk helemaal	Oh yes I haven't even thought about
2	niet aan gedacht om het te	using it. Hahaha.
3	gebruiken. Hahaha.	
4	Ja nee ik vind het niet moeilijk	Yeah, no I don't find that difficult but
5	maar wel om eraan te denken als ik	to think about it when I'm reading
6	die tekst aan het lezen ben.	that text.
7	Ik zal maar even dit invullen	I'll just fill this in
8	Ja misschien moet ik maar alsnog	Yeah, maybe I should just do
9	eens wat gaan doen	something
10	**Highlights 3 passages**	**Highlights 3 passages**
11	Ja de provincies dat de provincies	Yeah, the provinces that the
12	een belangrijke rol	provinces play an important role
13	**Assigns category** *'huidig beleid'*	**Assigns category** *'current policy'*
14	krijgen dat is natuurlijk voor de	get of course that's important for the
15	gedeputeerde staten wel van	Gedeputeerde Staten
16	belang	
17	provincies geven invulling aan de	provinces fill in the restrictive green
18	restrictieve groene contour	contours
19	provinciale landschappen	provincial landscapes

(P38#0:26:11-0:28:25)

In this example the participant said that he forgot to use iMarkup (line 1-2), and found it difficult to keep it in mind. Line 8-9 reflects the influence of the experimental situation as a motivator to start using iMarkup. Participants probably felt that they were supposed to 'help' the experimenter by using iMarkup. The resulting highlights were assigned to a category. In lines 11-12 and 14-15, the participant explained why the information read was relevant for the Gedeputeerde. This also provides a justification for annotating these passages. After this note, the participant resumed reading.

To summarize the processes that result in notes for the marker condition, participants were engaged in a process of goal setting, and evaluation, followed by taking notes with the marker, whereas the markings themselves were followed by new (reading) goals. Markings are thus part of a purpose-driven selection and evaluation process.

5.5.5 Conclusions: the Purposes of Note-Taking

In this section the circumstances that triggered note-taking were analysed. From these triggers we can infer the purposes of taking notes:

- *Increasing understanding of the task*

Across conditions, reading the task description frequently triggered writers to take notes by copying or paraphrasing parts of the task in Notepad, by highlighting passages in iMarkup, or by copying passages immediately to the advisory paper. Participants took such notes for the purpose of increasing their understanding of the task.

- *Pre-selecting useful information*

The dominant pattern of the activities that surround taking notes is reading, evaluation, and finally taking notes. After taking notes, the sequence starts up once again. This pattern was evident for participants in the marker condition and for all participants when they copy-and-paste passages from the sources to their advisory papers. The purpose of this sequence was to tentatively select information that could be used for the advisory papers later on in the process.

In the notepad condition, no pattern was found of reading, evaluating what was read, and subsequently taking a note. The additional step of taking notes with Notepad before writing text for the advisory paper could have been considered redundant. As such, the role of note-taking is assumed by copying and pasting passages to the advisory paper.

- *Avoiding usability problems*

Engaging in specific activities was, for both tools, sometimes the result of usability considerations. In the notepad condition, two participants chose to use Notepad rather than the smaller report window. Within iMarkup, participants sought to compensate for the lack of available space for taking notes. They chose to use large sticky notes to write draft advice or to elaborate on the desired structure of the advisory paper. These choices in both conditions stress the importance of having an overview of the information as the basis for the advisory paper. Unobtrusive but small-window applications such as iMarkup do not offer such an overview in one screen.

Apart from the aforementioned purposes of note-taking, the analysis of triggers to note-taking suggests that it is difficult to incorporate new technologies into existing practices when people are faced with a challenging task such as writing-from-sources. Notes in both the marker condition and the notepad condition are sometimes a side-effect of the cognitive load questions being asked. These questions then functioned as a reminder that a tool was available to take notes. In that case, participants simply did not remember that it was available. It may have been necessary to devote all their attention to the task itself. This implies that incorporating new technologies into existing practices is difficult when people are faced with a challenging task such as writing-from-sources.

5.6 Alternative Activities for Note-Taking

The analysis from the previous section has shown that participants took notes as the result of a number of different considerations. But it may also be the case that these same considerations did not result in note-taking for other participants. Some participants actually only took notes on a few occasions. Can the considerations that trigger other participants to take notes be found in the protocols of those participants who only take notes on very few occasions? It may be that instead of taking notes, these considerations resulted in activities other than taking notes – if writers perform other activities at all.

In this section we identify the same considerations we have found in the previous section in those protocols with only a minimal number of notes. We then analysed what writers do instead of taking notes.

5.6.1 Activities during Reading the Task Description

Participants in both the notepad condition and in the marker condition proved to increase their understanding of the task by taking notes, or alternatively by imme-diately composing the introduction of their advisory paper. But how do participants who only take notes on a few occasions increase their understanding of the task?

- *The extensive task comprehension process is postponed*

Two participants (participants 5 and 24) did not engage in an extensive task comprehension process, but started reading information from the sources first. Participant 5 first started to familiarize himself with the core terms of the field he was working in by reading and then paraphrasing the information he had read in his advisory paper:

(P05#0:16:13) *"ik heb er geen verstand van blijft toch wel erg lastig vrees ik"*
["I don't know anything about it, that's going to be a big problem I reckon that"]

It was only later in the process that he started to restructure the information he had read and paraphrased by using sticky notes:

(P5#0:48:15) *"Ik denk dat ik zo'n beetje moet proberen wat ordening in de zaak in 't advies aan te brengen. En nou kan misschien de sticky notes van belang van toepassing zijn"*
["I think I'll need to structure the whole thing the report a bit And maybe the sticky notes can be important, useful here."]

In these sticky notes he distilled the key themes from the passages he had written up till then (such as "advice", "differences and similarities"). These themes were eventually used as headings in the final version of the advisory paper.

Thus, the process of making his task representation more specific was postponed until he was familiar with the core concepts, and until he had collected enough information that was relevant at first glance. This information had to be restructured in order to be turned into an advisory paper with clear argumentation.

Participant 24 started by reading the sources. He wrote out the introduction of his advisory paper once he had found a citation he could use for it. He formulated his approach using the following announcement:

(P24#0:20:55) *"Nou ik denk dat ik dit, dit stukje dan maar eens even ga kopiëren en dan naar advies"*
["Now, I think I'll copy this, this bit and then go to the report "]

Before starting to compose, he reread the task description in order to remind himself of the issues that had to be dealt with. Similar to participant 5, the process of making the task representation more specific is postponed until some information has been read and evaluated. As such, for both participants, the task description was interpreted in the light of the information they read from the sources: the information contributed to the participants' understanding of the task.

- Taking a marginal number of notes

All participants but one took notes. When participants who were not inclined to take many notes did take notes, they took notes on the task description. Participants 7 and 8 paraphrased the task in Notepad (participant 7) or copied the task description to Notepad (participant 8). Thus, even though they took very few notes, they did take notes in order to improve their understanding of the task.

Participant 7 paraphrased his task in Notepad after the experimenter had shown which windows were available in the task environment. Once he had written out these notes, he did not use Notepad anymore. He formulated the introduction of his advisory paper. He then started consulting the sources looking for the task's core issues (*"nou eens even kijken waar ik dat kan vinden"* ["now let's see where I can find that"], P7#0:16:00). Subsequently he composed the remainder of his advisory paper based on what he had found in the sources. As such, composing the introduction contributed to the participant's understanding of the task.

In contrast to participant 7, participant 8 did not paraphrase the task, but copied the most important paragraph to Notepad. This is shown in Citation 5.11, displayed on the next page. Copying this paragraph was the first step in deriving the structure for the advisory paper from the task description.

The participant read the task description and concluded that one of the paragraphs was the core of the assignment (line 1). After some interface problems (line 4-8) he copied the task description.

Citation 5.11
Composing after Evaluation (Participant 5)

1	Nou de essentie is gewoon deze alinea	So now the essence is just this
2	he, dus ehm	paragraph, right, uhm
3	*Silence 6 sec.*	*Silence 6 sec.*
4	Kan ik dit gewoon kopiëren	Can I just copy this
5	*[Experimenter]* Ja hoor	*[Experimenter]* Yes of course
6	Ehm even zien eh d'r zit geen balkje	Uhm let's see uh there's no toolbar or
7	bij of eh	uh
8	Hier weer andere icoontjes	Another lot of icons here
9	*Silence 24 sec.*	*Silence 24 sec.*
10	**Copies task description**	**Copies task description**
11	**Pastes task description to Notepad**	**Pastes task description to Notepad**

(P8#0:11:43-0:12:21)

Following on from this citation, he wrote out the headings of the advisory paper, and subsequently the contents of the advisory paper before consulting the sources:

(P8#0:23:19) *"mijn mijn methode is om eerst het verhaal te presenterenen te spiegelen aan de onderdelen die je daarin hebt gezet ja"*

["my my method is to first present the story and to mirror it with the elements that you've put in there yes"]

In conclusion, when participants do not take notes at the start of the process to try to understand the task, they read and evaluate the sources before engaging in this task comprehension process. Formulating the introduction of the advisory paper or writing the headings of the advisory paper was found to serve as the activity that contributed to the understanding of the task. The other two participants did take notes to improve their understanding of the task either by paraphrasing or by copying parts of the task description.

5.6.2 Activities as Part of an Approach of Tentatively Selecting Information

In the marker condition – in particular participant 4 – we found an approach consisting of highlighting as an additional step preceding the copying of highlighted passages from the sources to the advisory paper. Since participants who took only a few notes did not make a tentative selection of information by highlighting or note-taking, participants may have performed other activities that elaborated their understanding of which passages were relevant and which were not. The question therefore remains what participants do in the time between the instances in which they did decide to copy the citations.

But the participants who do not take highlights or write notes did copy a few citations to their advisory papers. We examined the few instances in which the four participants with a minimal number of notes copied citations to the advisory paper. In these cases, copying citations was an interruption of the composition process at moments in which participants needed additional information from the sources or from the task description. An example is provided in Citation 5.12.

Citation 5.12
Coyping passages as part of the writing process

1	**Writes** *'Waar het dus om gaat. De provincie heeft*	**Writes** *'What it's about. The province plays an*
2	*een belangrijke taak in het toetsen van*	*important role in testing the development plans and*
3	*bestemmingsplannen en daarmee een bepalende*	*thereby a major factor for safeguarding the EHS from*
4	*factor voor het vrijwaren van de EHS van*	*being built on'*
5	*bebouwing'*	
6	**Navigates to** *'Rode functies in de EHS'*	**Navigates to** *'Red functions in the EHS'*
7	*Silence 29 sec.*	*Silence 29 sec.*
8	**Copies passage from** *'Rode functies in de*	**Copies passage from** *'Red functions in the EHS'*
9	*EHS'*	
10	**Activates report window**	**Activates report window**
11	**Pastes passage**	**Pastes passage**
12	**Writes** *'landelijk. Hierin kan de provincie een*	**Writes** *'national. The province can play an important*
13	*belangrijke rol vervullen'*	*role here'*

(P24#0:43:08-0:46:10)

The participant interrupts his composition process in order to select, copy, and paste a passage from the sources. This passage becomes part of his argumentation. After pasting the passage, the participant resumes composing. As such, transferring a passage to the advisory paper becomes part of the writing process and, in particular, part of the process of building a logical argument.

In this case, the two-step process of copying-and-pasting and subsequently modifying the copied citations was also encountered in participants who took only a few notes. However, participant 5 (marker condition with stock issues) and 7 (notepad condition without stock issues) evaluated information and paraphrased the information immediately in the advisory paper. They skipped the intermediate step of highlighting or copying information from the sources.

In between lengthy periods of writing, participant 7 read and evaluated parts of the sources to include new relevant issues in his advisory paper. The general pattern in his protocol was reading, sometimes followed by evaluation, formulating a writing goal, and finally summarizing in the advisory paper. An example is shown in Citation 5.13 on the next page.

In this example, the participant read about ecological quality in 'In-principle agreement'. He indicated that he understood what was being argued with a slightly negative expression (line 3). Nevertheless, he announced that he wanted to incorporate that issue in his advisory paper (line 5-6). But then he proceeded by reading another document (line 8-12), followed by another writing goal (line 14-15). It was only then that he started writing out these issues. Thus, the chunks of information he had to keep in mind prior to writing were relatively large, because the writer chose to read about two issues before starting to compose.

For this participant, reading and evaluation is followed by writing rather than note-taking. The step of note-taking is skipped. A comparable pattern was found for participant 5 in the marker condition with stock issues provided. Throughout his process, he demonstrated a pattern of reading, evaluating, and writing.

Citation 5.13
Composing after Evaluation (Participant 7)

1	Hoogwaardige natuurkwaliteit	High quality of nature
2	*Silence 4 sec.*	*Silence 4 sec.*
3	Ja dat snap ik ook allemaal wel	Yes I understand all that
4	Emissies	Emissions
5	Dat kan ik wel onder de noemer	I can put that under the heading
6	milieaukwaliteit vatten	envonmental quality
7	Eh stond hier iets in over	Uh there was something here about
8	**Navigates to** *'Klimaatverandering en*	**Navigates to** *'Climate change in the*
9	*de EHS'*	*EHS'*
10	*Silence 13 sec.*	*Silence 13 sec.*
11	Verdroging [??]	Drying out [??]
12	*Silence 4 sec.*	*Silence 4 sec.*
13	Klimaat ook eh milieu	Climate too uh environment
14	Laat ik dat er dan maar eventjes in	Let's just put that in quickly
15	verwerken	
16	**Activates advice window**	**Activates advice window**
17	*Silence 8 sec.*	*Silence 8 sec.*
18	**Writes** *'De 700 miljoen extra die dit*	**Writes** *'The extra 700 million that this*
19	*Kabinet beschikbaar stelt is wel een*	*Cabinet is making available is addi-*
20	*steun in de rug hiervoor, maar*	*tional support for this, but this is*
	landelijk wordt ingeschat dat dit nog	*reckoned to be inadequate at the*
	ontoereikend is'	*national level'*

(P07#1:01:31-1:02:56)

The difference with participant 7 is that participant 5 was evidently unfamiliar with the topic of the task.

(P5#0:11:09) *"dan zal ik eigenlijk willen zoeken wat rode functies, wat dat betekent (…) want ik weet hier toch te weinig vanaf om, dat is even moeilijk"*

["then I shouild really find out what red functions, what that means because I don't know enough about this to, that's difficult "]

Skipping the step of taking notes, the participant immediately wrote about the information in his advisory paper. An example is provided in Citation 5.14 on the next page.

In this example, the participant evaluated the housing construction in line 2-4. After remaining silent for a while, the participant decided to include this topic in his advisory paper. Instead of making a note, the participant decided to immediately incorporate the information in his advisory paper.

Citation 5.14
Composing after Evaluation (Participant 5)

1	Aantal woningen	Number of houses
2	Nou op zich valt het wel mee zo te	Well, it doesn't look that bad, about
3	zien, ongeveer 5 procent van 't totaal	5 per cent of the total number of
4	aantal nieuwe woningen	new houses
5	*Silence 5 sec.*	*Silence 5 sec.*
6	Dat zal ik er dan toch even bij zetten	I'd better put that in then
7	**Activates report window**	**Activates report window**
8	**Navigates to** *'Rode functies'*	**Navigates to** *'Red functions'*
9	**Activates report window**	**Activates report window**
10	**Writes** *'De huidige*	**Writes** *'The current admissions*
11	*toelatingsplanologie blijkt positief te*	*planning seems to be having a posi-*
12	*werken, het verdient dus aanbeveling deze planologie te blijven gebruiken'*	*tive effect, so it's worth recommending continuing with this planning*

(P5#0:46:16-0:46:44)

To summarize, whereas some participants demonstrated an approach similar to that of participants who took copious notes – by copying passages to the advisory paper – participants 5 and 7 both immediately composed passages based on the passages they had read and evaluated in the sources. For participant 5, this process of reading, evaluating, and writing had an additional function. Through the process of reading and evaluating, he achieved an understanding of the field of urban and landscape planning step-by-step.

His lack of prior knowledge about the field may explain why he did not take notes. This suggests that participants should have a certain amount of prior knowledge available for selecting and evaluating information in order to have enough resources available for taking notes.

5.6.3 Activities with the Purpose of Solving Usability Problems

Usability considerations proved to contribute to participants engaging in some note-taking activities. Participants primarily sought compensation for lack of features. In the marker condition, they used sticky notes because no note-taking space was available. In the notepad condition, Notepad was used because it offered more space than the report window.

Usability considerations also contributed to some participants' decisions *not* to take notes. One of the participants was very explicit about why he decided not to use iMarkup. On a few (5) occasions, he copied citations directly to the advisory paper instead. Following on from a cognitive load question, he stated:

(P24#0:22:39) *"Ja iMarkup gebruiken dat vind ik, ja, makkelijk je gebruik het niet dus tsss, (…)ja ik vind het gewoon makkelijker om stukjes tekst euh die je ziet staan meteen naar je advies te kopiëren dan dat je weer eerst binnen zo'n tekst allerlei stukken gaat kopie...gaat markeren"*

["Yes, using is, well yes, easy,so you don't use it (…) I think it's just easier to copy bits of that you think are useful to copy them stragh t away to your report rather than just start by copying, I mean marking all kinds of texts in the text"]

The main part of his process consisted of reading the sources and subsequently incorporating relevant information immediately into the advisory paper by writing. A similar process was observed for participant 7 from the notepad condition. This participant expressed trouble in

manipulating multiple windows. In response to a cognitive load question he said *("Hoe moeilijk vindt u het om Notepad te gebruiken op dit moment?"* ["How difficult are you finding it at the moment to use? That's do do with the whole manoeuvring business"], P7#0:23:08). Manipulating multiple windows simultaneously confused this participant. For that reason, he decided not to take any notes.

Both participant 24 and participant 7 decided not to take any notes as a result of usability considerations. Instead of considerations that result in a different choice of functionality being used (use Notepad instead of the report window as explained in Section 5.3), they decided not to use the tool at all or only to a small extent.

Participant 5 decided not to use iMarkup because of the lack of resemblance to his usual approach to this type of task. In response to the cognitive load question on how difficult it was to use the tool, he answered:

(P5#0:29:34) *"Dit heb ik nog steeds niet gebruikt moet ik zeggen. En dat komt omdat ik 't normaal eigenlijk ook nooit gebruik. Dat zal wel de reden zijn"*

["I still haven't used this I have to admit And that's because I don't normally use it anyway. That's probably why"]

For this participant it proved to be too hard to integrate the new tool (iMarkup) into his existing practices. His process focused on achieving an understanding of the core concepts within the field of urban and landscape planning. His lack of knowledge about the field may have restrained him from learning how to use iMarkup for the writing-from-sources task at hand.

In conclusion, participants consciously evaluated the usefulness of the tools and decided not to use them because they preferred transferring information directly to the advisory paper, or because the tools did not fit within their usual practices.

5.6.4 Experimental Events

The cognitive load questions elicited taking notes for those participants with more than a minimal number notes. For those participants who only took a few notes, the cognitive load questions tool elicited comments on the usefulness of the tool. These comments were addressed in 5.4.4.

In a few cases, experimental events did result in taking notes, although this happened only immediately after these events. In the remainder of the process they resumed working without taking notes. An example is provided in Citation 5.15.

In this example, the experimenter brought the different windows in the task environment to the participant's attention (line 1-3). Immediately afterwards, the participant activated Notepad, remained silent for a while, and started formulating a note (line 5-10). This note contained a task paraphrase. After adding a sentence to this task paraphrase, he did not use Notepad any further.

Citation 5.15
Taking notes as outcome of experimental events for participants taking few notes

1	*[Experimenter]* Daar kunt u	*[Experimenter]* You can make notes
2	aantekenignen maken en in dit	there and in this window you can write
3	venster kunt u 't advies uitschrijven	out your report
4	Oke	OK
5	**Activates Notepad**	**Activates Notepad**
6	*Silence 7 sec.*	*Silence 7 sec.*
7	Het moet dus eh bestaande	So it has to be uh existing
8	**Writes** *'bestaande beleid kort*	**Writes** *'current policy describe briefly*
9	*weergeven. Consequenties scenario*	*consequences scenario 160,000 ha red*
10	*160.000 ha rode functies'*	*functions'*

(P7#0:13-20-0:13:34)

After experimental events, participants who took only a few notes either explained why they were not taking notes or they took notes immediately afterwards, but resumed their usual practice without taking notes later on.

5.6.5 Conclusion

In this section it was shown that most considerations that were found to result in taking notes have their equivalents in the processes of participants who took only a few notes. The primary alternative for taking notes is writing immediately after reading. Participants read and evaluate the sources and immediately compose about the information they have read in their advisory papers.

Although participants only took a few notes, two participants were found to copy or paraphrase the task in Notepad, which contributed to their task representation. Those participants who did not engage in such a task comprehension process immediately started to evaluate the sources before planning their process.

Some participants were very explicit about why they decided not to take any notes. One participant saw the additional effort of taking notes as unnecessary because copying passages to the advisory paper was considered more convenient. He was unable to integrate the new tools with his existing practices in a constructive manner.

Another participant did not take notes because taking notes with these tools deviated from the writer's usual approaches to a writing-from-sources task. This last reason seems to suggest that in complex tasks such as writing-from-sources writers will only start using new software when it is highly similar to their existing practices.

5.7 Effect of Taking notes on Cognitive Load

In the writing-from-sources framework we have related 'Cognitive load' to note-taking, because taking notes is hypothesized to reduce the cognitive load required by the task (O'Hara et al., 2002). In our study we asked participants not only to report on how difficult the task was for them, but also on how difficult the use of the note-taking tool was: the introduction of a new tool may impose a cognitive load in itself.

In this section the cognitive load of using the tools to take notes is analysed as reported by the 38 participants. More specifically, we address the relationship between the cognitive load of the tool and:

- note-taking activities (*Section 5.7.1*)
- monitoring activities with respect to note-taking (*Section 5.7.2*)
- time in the process (Section 5.7.3).

5.7.1 Relationship between Cognitive Load of the Tool and Note-Taking Activities

As a measurement of cognitive load, participants were asked every ten minutes to indicate on a nine-point scale how difficult they were finding it to use these tools. In this section the reported cognitive load is analysed with respect to differences between the four conditions. Next we will draw the relationship between the cognitive load of the tool and note-taking activities.

We first computed the average cognitive load of the tool across conditions and across all moments during the process in which the cognitive load was measured. The results are shown in Table 5.9.

Table 5.9
Average Cognitive Load of Writing-from-sources Task and Tool to Take notes

	Notepad		Marker	
	Without stock issues	With stock issues	Without stock issues	With stock issues
Tool	4.7 (2.4)	4.6 (2.6)	4.3 (2.3)	5.6 (1.7)
Task	5.4 (1.4)	5.8 (1.7)	5.5 (1.1)	4.9 (1.5)

Note. Values could range from 1 (very easy) to 9 (very difficult).

On a nine-point scale ranging from 'very easy' to 'very difficult', the reported cognitive load is moderate. Thus even though both the application and its potential use were relatively unfamiliar to the participants, the cognitive load of using these tools remained quite moderate.

A multivariate analysis of variance was conducted to determine whether the tool for taking notes, and whether stock issues are provided or not, affect the cognitive load of the task or of the tool. Dependent variables were both cognitive load measures, while the tool and the provided stock issues were the fixed factors. Neither multivariate effects ($F(df=2)<1.86$, n.s.), nor between-subjects effects were found ($F(df=1)<2.50$; n.s.).

This is surprising since the resemblance with other applications that are familiar to participants is much larger in the notepad condition than in the marker condition. One could expect that using the tools is easier for participants in the notepad condition who are accustomed to using a tool comparable to a word processor. iMarkup was completely new to all participants with respect to the interface and the purposes for which it can be used.

It may be that an easy transfer of skills from paper to using iMarkup facilitated learning. Both highlighting and sticky notes have paper counterparts. Participants may have found it relatively easy to learn how to use the digital equivalent for marking passages and using yellow sticky notes. Although note-taking on screen is also quite comparable to paper, users do not have their notes and their reading sources on screen simultaneously. This requires writers who

are confronted with an entirely on-screen writing task to learn how to effectively use the new tool environment.

Thus, an easy transfer of skills in the marker condition combined with a required learning process in the notepad condition could provide an explanation for the lack of significant differences regarding the cognitive load of the tool.

Some evidence can be found for this explanation in the questionnaire. Participants in the marker condition did not differ from participants in the notepad condition in terms of how easy it was to learn to use the note-taking ($t(35)=-.35$; n.s.). Thus, even though Notepad is far less complicated in terms of its manipulation, the ease of learning did not differ from iMarkup, suggesting that the use of Notepad involves more than just the manipulation of the tool: users have to learn how to use it effectively for the task they are carrying out.

Next we examined the relationship between the cognitive load of the tool and specific note-taking activities. In our analysis we made a distinction between the notepad condition and the marker condition since in these conditions participants could carry out different activities. No significant correlations were found in the notepad condition or in the marker condition. Thus, the cognitive load that the tool imposes is not related to the specific note-taking activities that participants carry out during the writing-from-sources task.

In conclusion, the cognitive load of the tool did not differ between the marker condition and the notepad condition. The ease with which writers were able to learn how to use the tools was offered as an explanation for the lack of differences in cognitive load.

5.7.2 Relationship between Cognitive Load of the Tool and Monitoring Activities

Apart from the background characteristics of the participants, it may be that certain types of cognitive activities influence the cognitive load of the tool, or the other way around, i.e., are the result of the cognitive load of the tool.

The cognitive activities of the twelve participants whose protocol was fully transcribed were analysed. The resulting relative frequencies were correlated with the cognitive load of the tool. In this correlational analysis, a distinction was made between the two note-taking tools as both the learning processes and the actual use are assumed to be different in terms of the cognitive activities people engage in (See Section 1.10.1). Non-parametric correlations (Spearman's Rho) were computed because of the small number of participants[6].

Table 5.10
Correlations between Cognitive Activities and Cognitive Load of the Tool

	Notepad		Marker	
	Rho	α	Rho	α
Planning of note-taking			.81	.05
Evaluations of the tool			.83	.04
Comments on the experimental situation	-.99	.00		

Note. Only significant correlations are shown. N= 6 in both conditions.

[6] The number of participants is too low to run partial correlations, which would have enabled us to control for the cognitive load of the task.

In the notepad condition, participants' comments on the experimental situation proved to be strongly correlated with the cognitive load of the tool. Comments in this category consist of remarks about thinking aloud, and explanations of how difficult the task was when asked by the experimenter to respond to the cognitive load questions. It might be that when participants found it easy to use the tool, they had more cognitive resources available for a reflection on the experimental circumstances, resulting in a negative correlation between the number of communication units in which comments are given on the experimental situation and the perceived cognitive load of the tool.

Interestingly, in the marker condition, the planning of note-taking proved to be correlated with the cognitive load of the tool. This correlation may be explained by cognitive load theory. Cognitive load theory stresses that non-automated processes impose a load on working memory, which has limited capacity (Valcke, 2002; Van Merriënboer & Sweller, 2005). The less taking notes is an automated process for participants, the more likely it is that intermediate steps of note-taking such as announcing become visible in the think-aloud protocols. According to Ericsson & Simon (1984) automated processes cannot easily be verbalized, because working memory is not involved.

The number of remarks about the tool (iMarkup) was significantly related to cognitive load. This is not surprising, since the majority of such comments occurred when participants were not able to accomplish what they wanted with iMarkup, which adds to the cognitive load of using that tool.

The most illustrative example of such comments comes from participant 19. She even got frustrated about using the tool as it distracted her attention from what she ultimately had to do: compose an advisory paper. She said:

(P19#0:29:50) *"Ik denk van ja daar gaat het helemaal niet om al dat geplakker en germarkeer"*
["Then I think yeah that´s not what it´s all about, all that stickering and marking"]

A few minutes later she said:

(P19:034:35) *"Zo zou ik nooit een advies kunnen schrijven ook want dan strand ik in de techniek"*
["I could never write a report in that way because I´d just get lost in all that technology"]

At a certain point she decided that she wanted to stop using iMarkup because she finally wanted to focus on writing her advisory paper. She stated:

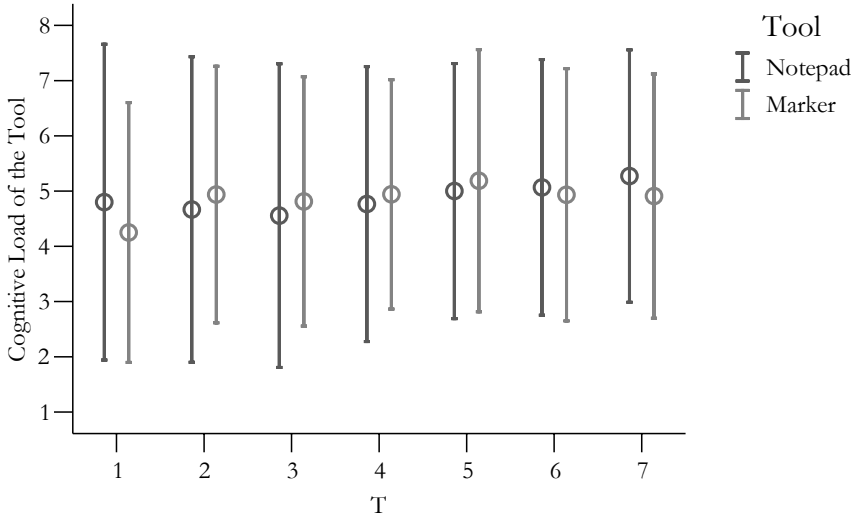
(P19#0:35:31) *"Ja dat is weer even een intern conflict bij mij want eh hoe ik me nu focus op het maken van een advies. En dan denk ik van hupsakee gooien we al die briefjes en die markeringen aan de kant en dan begin ik gewoon weer uit m'n hoofd"*
["Yeah, that´s another internal conflict inside of me, because, uh, the way I´m focusing on writing a report And then I think OK then, let´s get rid of all those sticky notes and those highlights and just start all over with what´s in my head"]

This expression is an example of how the cognitive load of using the tool influences the cognitive load of the task. She proved to be the only participant who verbalized frustration. The other participants who used iMarkup sometimes experienced minor interface problems, but they did not indicate that they lost focus on the writing-from-sources task. Participant 19's remarks about the tool contributed heavily to the strong correlation between comments on the tool and the cognitive load of using iMarkup. Without participant 19, the correlation would not reach significance ($r(5)=.70$; $p>.15$).

5.7.3 Cognitive Load of the Tool over Time

There may also be differences in the cognitive load over time. Participants may find it difficult at the start of the process to use the tool, because at that moment they are relatively unfamiliar with it. At the end of the process, when they are finishing the advisory paper, and have had access to the tools for some time, the cognitive load of the tool will presumably be lower.
To test our assumptions, we computed the average cognitive load for each measurement. In Figure 5.2 the average cognitive load plus or minus one standard deviation is displayed for each measurement in 10 minute intervals (as depicted on the X-axis). As the eighth measurement contained too few cases, it was left out to avoid biasing the results.

Figure 5.2. Average cognitive load of the tool over time



Examination of the graph shows that the cognitive load of the tool remains relatively constant throughout the process, but that participants varied in the cognitive load they experienced, as can be seen from the large standard deviations. In the notepad condition, the cognitive load decreased slightly until the third measurement, and then rose towards the end of the process. In the marker condition, the cognitive load rose to its peak in the second measurement and remained relatively constant afterwards.

To determine whether there is a relationship between the tool used and the level of cognitive load experienced on each of the measurements, a repeated measures analysis was conducted. As too few people completed the last two measurements because they had already completed the task, only the first six measurements were included. Measurement was introduced as the within-subjects factor, and Tool as the between-subjects factor.
A multivariate effect of Measurement was found ($F(df=5)=3.13$; $p<.05$). The interaction effect of Measurement x Tool ($F(df=5)=2.39$; n.s.) as well as all within-subjects effects ($F(df=1.95)<1.14$; n.s.) were not significant. No between-subjects effects of Tool were found ($F(df=1)=.02$; n.s.). In conclusion, the cognitive load of the tool proved to be independent of the phase in the process and the tool that was used.

5.7.4 Conclusions

The cognitive load of the tool proved to be related to some cognitive activities regarding note-taking. Surprisingly, the cognitive load of the tool was the same in the marker condition as in the notepad condition. A comparable learning process for using the tools was offered as the explanation for the similar levels of reported cognitive load.

Although it occurred with only one participant, an interesting interaction was found between the cognitive load of using the note-taking tool and the cognitive load of the task. Due to her lack of ICT skills, participant 19 found it so difficult to use iMarkup that she lost her focus on the writing-from-sources task.

5.8 Conclusions

Taking notes proved to contribute to the writing-from-sources process of the twelve selected participants in various ways. In this section an answer is provided to the main question of this chapter regarding the purposes of taking notes during writing-from-sources.

5.8.1 Purposes of Taking notes

From the analyses that were carried out in the previous sections regarding different aspects of note-taking, the following three main purposes could be derived:

- *Note-taking facilitates task comprehension*

Taking notes proved to serve not only a purpose for the final composition as *product* of writing-from-sources but also a purpose during the *process* of writing-from-sources. Since participants had to distill the relevant aspects from the task description in order to decide on their approach to the task, they performed various note-taking activities to improve their task comprehension. In the marker condition, they highlighted passages from the task description, paraphrased parts on sticky notes, or copied parts immediately to the advisory paper as the first step in composing the introduction.

In the notepad condition, they also paraphrased the task, copied it to Notepad or immediately to the advisory paper. In paraphrasing, they restructured and selected information from the task description.

These activities helped writers to select the relevant parts and thus to understand what, in their view, was expected from them. As such, taking notes served an encoding function (Kiewra et al., 1995).

The effort participants spent on reading the task description is in line with Wineburg (1998) who studied the reading processes of two historians. She showed that an expert historian was able to construct an interpretive framework by means of which information was interpreted. This interpretive framework is highly similar with the process of task interpretation we have found in our study. Similar to Wineburg (1998), this process of task interpretation required substantial cognitive effort.

However, whereas the historian in her study had little content knowledge available, the participants in this study could make use of extensive content knowledge. In spite of their knowledge, the process of constructing an interpretive framework still required much cognitive effort.

- *Note-taking is used as a pre-selection of useful information in preparation for composing*

Participants in the marker condition in general exhibited a pattern of reading passages, evaluating the information, and subsequently highlighting it or paraphrasing it in a sticky note. The temporary storage of these evaluations in preparation for writing the advisory paper is the prime purpose of taking notes.

A similar pattern was found for participants who copy passages to their advisory papers. They evaluate a passage, copy-and-paste it to their advisory paper, and modify it immediately afterwards, or further on in the process. The copied passage as the result from a positive evaluation is stored temporarily in the advisory paper with the purpose of modifying it later in the process.

In terms of previous research, taking notes in an on-screen environment also served an external storage function (Di Vesta & Gray, 1972), even though this process was far less important in the notepad condition than in the marker condition.

- *Note-taking enables writers to restructure information that is collected from the sources*

Although the functionality of the note-taking tools partially overlaps, they are distinct on other aspects. Because in the marker condition no free space was available for taking notes, participants indicated that they sought to compensate for the absence of this feature. They also expressed a desire for a blank sheet of paper.

Sticky notes were used to restructure the information the participant had collected during the reading process. In order to outline the structure of the advisory papers or to outline its key components, participants made use of sticky notes. In terms of O'Hara et al. (2002), in that sense sticky notes were used to collect information from disparate locations.

In the notepad condition, participants also proved to use the note-taking tool to restructure information. However, they only used the tool to restructure information from the task description. In contrast to participants in the marker condition, no such process was found while reading information from the sources.

In sum, taking notes helped writers to understand the task they were provided with, and subsequently to evaluate, collect, store, and restructure the information that is deemed useful for the advisory paper.

5.8.2 Adopting New Technology in the Writing-from-Sources Process

In this chapter the purposes of taking notes within a completely on-screen environment have been studied. These purposes lead to the conclusion that learning to use new tools such as the marker tool not only involves the manipulation of the tools, but also involves learning how the tools can be incorporated into existing practices.

Writers weigh the effort of incorporating new technology against its potential benefits

The purposes for which participants were found to take notes proved to depend at least in part on the extent to which they were able and willing to incorporate the new tools into the practices they were accustomed to.

Some participants took notes frequently. They quickly learnt the purposes for which the features of the tool could be used. Other participants decided not to engage in this process of learning.

A pattern of reading, evaluating, and paraphrasing the information immediately in the advisory paper was found to be a substitute for taking notes. The choice to take notes then is the result of a usefulness evaluation: by which means can the writers accomplish their goals (i.e. collecting useful information for the advisory paper) in the most efficient manner.

On some occasions, participants found it more efficient to skip taking notes. In the notepad condition, the additional step of taking notes about information from the sources instead of immediately writing about the information writers have read, was perceived as redundant, while this was only seldom the case for the marker condition: only occasionally highlighting passages was perceived as redundant.

Writers take notes when they have moderate levels of prior knowledge

Since using a tool is not the only task users perform, the complexity of the task for which the tool is used influences the extent and the purposes for which the tools are used. Participant 5, whose verbal protocol showed a lack of content knowledge, explicitly decided not to take notes because of the lack of resemblance with his usual practices. The combination of the efforts he had to put into familiarizing himself with the field combined with learning the potential uses of iMarkup during his writing-from-sources process could have seemed to be too much. As a consequence, the participant decided to skip the step of taking notes and to rely on the practices he was accustomed to. The lack of prior knowledge prevented this participant from taking notes.

In contrast, when participants were well-informed about the field, they tended to compose their advisory paper without consulting the sources, and thus almost without taking notes. In that case, the purposes for which the tools could be used are rather limited. Prior knowledge then reduced the usefulness of the tools.

In sum, the decision whether to use the tool or not is influenced by writers' prior knowledge. Writers who have too little prior knowledge or too much prior knowledge are less likely to take notes.

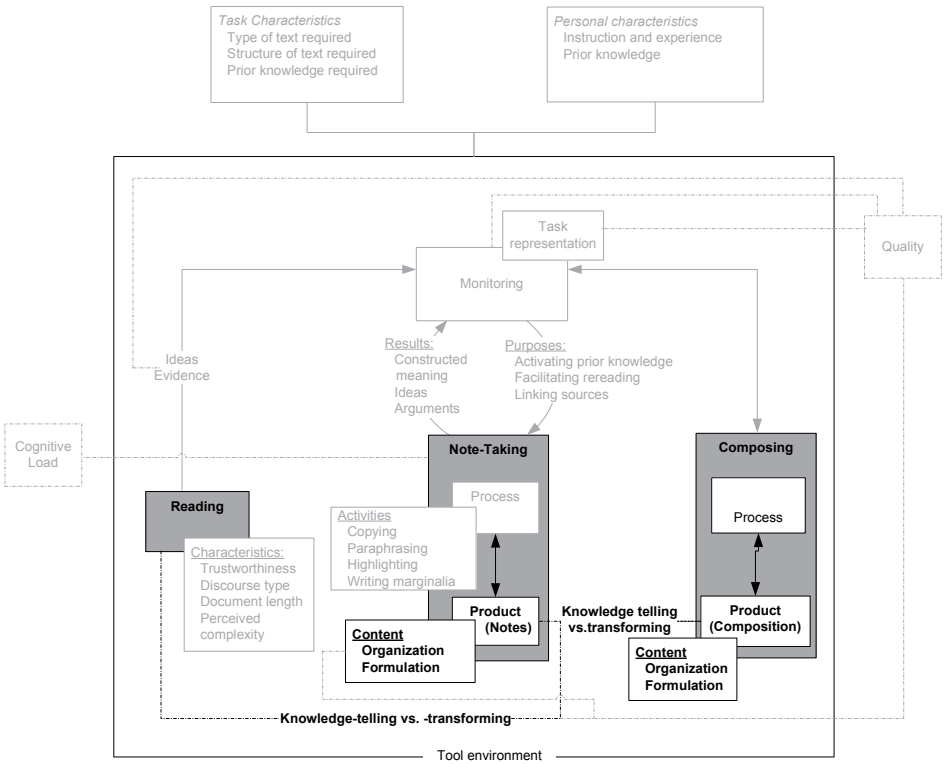
In this chapter the process of taking notes has been analysed with an emphasis on the purposes that taking notes serve throughout the reading and writing processes. In the next chapter we shift our attention to the contents of the notes and analyse how the sources are used.

Relationship between Sources, Notes, and Advisory Paper

Chapter 6

The analyses of the writing-from-sources *process* have shown that writers primarily engage in a purpose-driven process. This applies to both the writing-from-sources process in general and the subprocess of note-taking. Instead of focusing on the *process*, we now focus on the notes and the advisory papers as the *products* that result from this process. In this chapter we will analyse the extent to which the purpose-driven approaches to writing-from-sources can be observed from analysing the 'flow' of information from sources, to the notes, to the final advisory papers. In Figure 6.1 we have highlighted the relationships in our framework that will be investigated in this chapter.

Figure 6.1. Writing-from-sources-framework with the focus of Chapter 6 emphasized



We investigate the modifications in both the *organization* and the *content* of the advisory papers. These modifications are perceived as indications of the extent to which writers' writing-from-sources processes can be characterized as knowledge-telling or knowledge-transforming. In other words, we assume that from the types of modifications writers make from the sources, to the notes, to the advisory papers we can infer the extent to which writers engage in a knowledge-telling and/or a knowledge-transforming approach.

We take a qualitative text-analytical approach to investigate the specific modification processes that have taken place, after which we analyse these processes on a higher level quantitatively. In Section 6.2 we will address the organization of the notes, while in Section 6.3 we will analyse the content of the notes.

In educational research the content and organization of the notes have been shown to be a predictor of performance (see Section 1.3 and 1.10.1). In education there is a direct relationship between information from the source and performance, as reflected in, for instance, the number of items from the sources that are correctly recalled. However, in writing-from-sources, the relationship between performance and note-taking is indirect: the composition process *moderates* the relationship between the content and organization of the notes on the one hand, and performance on the other.

In this chapter we will analyse the relationship between the content and organization of the notes on the one hand, and the content and organization of the advisory papers on the other. Subsequently in Chapter 7 we will address the relationship between the quality of the advisory papers and:

- the content and organization of the notes
- the content and organization of the advisory papers

6.1 Methodology

6.1.1 Segmentation of notes and advisory papers

To make quantitative analysis possible, a unit of analysis is required that makes it possible to easily segment the advisory papers and notes into units and to count them subsequently. A *clause* has been chosen as the unit of analysis. Following Schmitter-Edgecombe & Bales (2005), a clause is narrowly defined as a subject, its verb, and any extraneous modifiers. For instance:

> *"Dit geldt ook voor de soorten in de Vogel- en Habitatrichtlijn-gebieden | die Nederland op grond van Europese verplichtingen moet beschermen"*
>
> ["This also applies to the sorts in the areas of the European Birds and Habitats Directives | that the Netherlands is required to protect by European law"]

In this example two clauses are identified: "This also applies…Directives" and "that the Netherlands…protect". The dependent clause "that the Netherlands…European" is counted as a separate clause.

6.1.2 Analysis of the Organization of the Notes

To get an impression of the organizational changes that the participants made from notes to advisory paper, the headings in the notes were compared to the headings in the resulting advisory paper. Headings are an important structural element since they make it possible to

scan the advisory paper, which is key to professional readers being able to quickly retrieve necessary information.
The changes that headings undergo from notes to advisory paper provide insights into how information is collected, organized, and ultimately transformed into an advisory paper. In the notepad condition, a clause was identified as a heading if:

- It covered the topic of the clauses that immediately followed it
- It is visually distinguishable from other clauses by a preceding blank line and a subsequent new line

It is quite unlikely that participants in the marker condition would supply their markings with headings, since the notes that could contain text (the sticky notes, and the comments that were added to the highlights) proved to be rather short. However, the categories in iMarkup can be regarded as equivalents to the headings in Notepad since they both can regarded as an organizing mechanism to group related information.

In the notepad condition, the number of clauses below a particular heading tells us about the distribution of the modification process across the subprocesses of writing-from-sources, reading, note-taking, and composing. Are authors modifying and organizing information already while reading and note-taking, or do they organize and transform information while they are composing their advisory paper?

In the marker condition, we counted the number of markings that were shared under a particular category as an equivalent to the number of clauses below a heading.

In the conditions with stock issues provided, headings were counted only if clauses (notepad condition) or markings (marker condition) were shared below them, since the provided stock issues are not the result of a participant's own cognitive activities and effort. Counting these headings would distort the data.

A preliminary examination of the headings suggests that there are two different types: headings that cover potential content for the advisory paper (e.g. "current policy") and headings below which the issues that the participant has been asked to deal with in his advisory paper were listed (e.g. "attention for" or "in advice"). In our analyses we distinguish between these two types of headings.

6.1.3 Analysis of the Organization of the Advisory Papers

Comparable to our analysis of the organization of the notes, we analyse the organization of the advisory papers in terms of the headings that participants used. We coded and counted the presence of two types of headings:

- *Functional headings*: headings that reflect the genre of advisory papers
- *Content headings*: headings that reflect the issues that were asked for in the task description

Functional headings reflect the authors' awareness of the genre of advisory papers. Content headings reflect the task's main issues, as well as inform us of the extent to which authors have engaged in a modification and organization process during the composition process when the content headings in the advisory paper are compared to the content headings in the notes. Therefore, to analyse the organization of the advisory papers, the presence of headings of two types was coded.

Based on a preliminary examination of the headings in the advisory papers, we have listed and defined a number of different types of functional and content headings. The resulting headings are defined in Tables 6.1 and 6.2.

Table 6.1
Functional headings in the advisory papers

Type of heading	Definition	Example
Title	First line reflecting subject of whole advisory paper	*Advies aan gedeputeerde n.a.v. vragen uit PS gesteld door de Groenen* [Advice to gedeputeerde in response to questions from PS posed by the Green party]
Salutation	One or more out of the set: From, To, Subject, Date, Dear	*Geachte Gedeputeerde* [Dear Member of the Provinical Executive]
Motive	Header that reflects the reason why an advisory paper is written (i.e. questions asked in provincial parliament)	*Aanleiding* [Cause]
Introduction	Header that indicates that the content of the advisory paper is being pointed out	*Inleiding* [Introduction]
Conclusions	Header that indicates a summary, explicit advice or answers to the parliamentary questions	*Advies* [Advice]
Closing	Signing of the letter, contact information, encouragements to ask for additional information	*Met vriendelijke groet,* *Piet* [Yours faithfully, Piet]

Table 6.1 suggests that two structural elements from two genres were used: letters (as reflected in salutation, and closing headings) and advisory papers (title, introduction, and conclusion headings).

Table 6.2
Content headings in the advisory papers

Type of heading	Definition	Example
Current policy	Header that refers to the description of current policy and policy with respect to the subject of the advisory paper	*1. Het huidige beleid ten aanzien van de Ecologische Hoofdstructuur* [1. the current policy regarding the Main Ecological structure]
Threats to policy objectives	Header that indicates that undesirable situations in relation to policy objectives are being described	*Gevolgen VIJNO voor de natuurkwaliteit* [Effects of VIJNO for the quality of nature]
Potential actions	Header that indicates that potential actions are being proposed	*Maatregelen om beleidsdoelen te realiseren* [Measures to realize policy goals]
Consequences of actions for ecological quality	Header that indicates that the implications of the actions' consequences are being described	*Consequenties ten aanzien van EHS* [Consequences regarding EHS]
Provincial implications	Header indicating that the subject of the advisory paper is being applied to the situation in the participant's province	*Realisatie Utrecht* [Realisation in Utrecht]

As can be seen from Table 6.2, content headings in the advisory papers reflect the task's core issues.

6.1.4 Analysis of Modifications from Sources to Advisory Papers

The analysis of how participants modified the sources and the notes to passages in their advisory paper was addressed from two directions. Both the *origin* of each clause in the advisory paper and the *use* of each clause from the notes were determined. The advisory papers of the same twelve participants were used that were also described in the process overviews provided in Chapter 4.

The origin of each clause in the twelve advisory papers and in the notes was determined. A clause in the advisory paper can be directly derived from the sources, from the notes or from prior knowledge. Clauses were assumed to be derived from prior knowledge when they could not be traced back to the source documents or the notes. A small share of this category includes the clauses that contain headings that cannot be derived from the sources or the notes, such as the functional headings listed in Table 6.1.

Information in a clause from the sources may also be modified during note-taking, or while composing the advisory paper. The clauses in the notes could be used in the advisory paper with or without paraphrasing, or may not be used at all. The nine potential sources and uses of information are summarized in Table 6.3

Table 6.3
Modifications of Clauses from the Sources via the Notes to the Advisory Paper

Notes	Advisory paper
1. Copied from source	Copied from notes
2. Copied from source	Paraphrased from notes
3. Copied from source	X (not used)
4. (no tool used)	Copied from source
5. Paraphrased from source	Copied from notes
6. Paraphrased from source	Paraphrased from notes
7. Paraphrased from source	X (not used)
8. X (no notes taken)	Paraphrased from source
9. X (no notes taken)	Derived from prior knowledge

In the marker condition, participants are unlikely to copy information using iMarkup. However, highlighting information or copying information verbatim to sticky notes is conceived as copying. Participants could paraphrase information in comments that were added to highlights or in sticky notes.

In the notepad condition, participants were able to copy information simply by writing or by using the copy-and-paste function. Paraphrasing could be simply done by typing.

As argued in Section 3.8.1, copying citations immediately to the advisory paper is conceived as taking notes. The difference with the other forms of taking notes is that the notepad or marker tool is not used.

6.2 Modifications in Organization from Notes to Advisory Paper

In this section we will analyse the relationship between the organization of the notes and the organization of the advisory papers. We will focus on the modifications that took place between writing headings for the notes and composing the advisory papers. First we undertake an in-depth analysis of two cases, after which we will take a more higher-level perspective and analyse the relationship between the organization of the notes and the organization of the advisory papers quantitatively.

The modifications shed light on the extent to which a knowledge-telling approach and a knowledge-transforming approach can be inferred from the organization of the notes in comparison to the organization of the advisory papers.

6.2.1 Two Examples

To get a detailed insight into the modification processes that took place, two cases are analysed and described qualitatively. Participant 32 has been selected from the notepad condition without stock issues provided, while Participant 28 has been selected from the marker condition without stock issues provided.

These participants were chosen with the purpose of maximizing the variety and richness of the modifications from the sources to the notes and then to the eventual advisory paper. The selected cases contained headings in both the notes and the advisory paper. The same cases will be used in the analysis of modifications on the content of the notes and the advisory paper.

Participant 32

For participant 32 (notepad condition without stock issues) the headings in the advisory paper are partly based on the headings in the notes and on the contents of the notes. The headings of the advisory paper and the headings in the notes are displayed in Citation 6.1 and Citation 6.2 respectively[7].

Citation 6.1. Headings in the notes of #32

1	Aanleiding vraag	Motive for question
2	Antwoord op de volgende vragen	Answers to the following questions
3	Stand van zaken realisatie EHS in relatie tot regeringsbeleid Balkenende 2	State of affairs realization EHS in relation to government policy Balkenende 2
4	Rode en groene contouren in de vijfde nota RO	Red and green contours in the Fifth Memorandum SP
5	Inschatting effecten Vijfde Nota Ruimtelijke Ordening	Estimation effects Fifth Memorandum on Spatial Planning
6	Natuurkwaliteit neemt toe; door versnippering blijft rendement natuurbeleid beperkt	Quality of nature increases; through fragmentation, yield of conservation policy remains limited
7	Provincies verdienen steun in de rug bij de bescherming van natuur en landschap	Provinces deserve additional support in protecting nature and landscape

Citation 6.2 Headings in the advisory paper of #32

1	1. Het huidige beleid ten aanzien van de EHS	1. The current policy regarding the EHS
2	2. Consequenties vijfde nota op het realiseren van de EHS	2. Consequences of the fifth memorandum for the realization of the EHS
3	2.1 Het contourenbeleid in de vijfde nota	2.1 The contour policy in the fifth memorandum
4	2.2 Uitwerking groene contouren	2.2 Elaboration green contours
5	2.3 Risico's realiseren EHS binnen de groene contouren	2.3 Risks involved in the realization of EHS within the green contours
6	3. Rol van de provincie	3. Role of the province
7	4. Conclusies	

[7] The terms related to the task's topic are explained in Appendix B.

A certain overlap seemed to exist between Sections 2.1, 2.2 (line 3-4, Citation 6.2) and Section 1 (lines 1-5, Citation 6.2), as they all described the current policy. Section 1 addressed the risks of the reduced influence of the national government on the realization of the EHS rather than the current policy regarding the EHS in itself, while the third section addressed the role that provinces play in EHS protection according to the Vijno. Thus, the headings seemed not to cover the content of the sections entirely.

The first two headings in the notes (Citation 6.1, line 1-2), which were written in an early stage of the process, reflected the reason for the advisory paper and what had to be included in it. In lines 3-4, the headings covered the contents of the notes below that heading, each describing one of the issues that was asked for in the task description. The last three headings (line 5-7) are in fact headings that were part of the citations copied from the sources. The notes below the headings were copied from the task description or from the sources.

In using the headings in the notes for the advisory paper, a number of modifications took place. As can be seen from Citations 6.1 and 6.2, the section headings 2.1-2.3 from the advisory paper (Citation 6.2, lines 3-5) are based on the heading "Red and green contours in the Fifth Memorandum Spatial Planning" (Citation 6.1, line 4) in the notes.

The first modification in this example is an *abstraction* from the heading in the notes "red and green contours in the vijfde nota RO" to "the contour policy in the vijfde nota". The terms "red" and "green" have been removed, while the term "policy" has been added to "contours". "Fifth Memorandum SP" is abbreviated to "Fifth memorandum". The resulting heading is more on an abstract policy level, relating to the political situation in which this advisory paper was written.

In the heading for Section 2.2. (Citation 6.2, line 4), the term "Elaboration" suggests that "green contours" are appointed, for instance within the province of the participant. However, this section describes the implementation of EU regulations within the green contours on an abstract level, as well as the beneficial consequences of interconnected nature reservations. Thus, there seems to be a contradiction between the heading of the section and the contents of that section.

The second modification between the headings in the notes and the headings in the advisory paper is *dividing* a section in the notes into two sections in the advisory paper. In the notes, the heading "red and green contours in the fifth memorandum SP" is split up into three subsections (lines 3-5 in Citation 6.2) in the advisory paper. The amount of information below the heading may have become too extensive to incorporate it under one heading in the advisory paper. The next section addresses the contents of these sections in more detail.

The third modification in this example from headings in the notes to headings in the advisory paper is the *application of a hierarchical scheme*. In the notes, all headings are on the same level, while in the advisory paper the participant applied a hierarchical scheme in the second section of his paper (Citation 6.2, lines 2-5). While in his notes "Estimation effects Fifth Memorandum on Spatial Planning" were on the same level, the corresponding sections in his advisory paper "Consequences Fifth Memorandum for the realization of the EHS" contained three subsections 2.1-2.3, derived from the heading "Red and green contours in the Fifth Memorandum SP".

The third heading in the advisory paper ("Role of the provinces") can also be traced back to the headings in the notes: "Provinces deserve additional support in protecting nature and landscape" (Citation 6.1, line 7). The modification that took place here was again *abstraction*, but also making it *neutral* rather than opinionating. "Role of the provinces" does not express an opinion, but implies an assessment or description of the role that provinces have in protecting the EHS.

Lines 2-7 from Citation 6.1 contain sentences that were copied from the task description, while these sentences were shared under headings that reflect the motive for the advisory paper and the questions that needed to be answered (line 1-2).

Some of the clauses below these headings also formed the basis for the headings in the advisory paper. The participant copied the most meaningful parts (the main issues) of the task description to Notepad and shared them under the headings "*aanleiding vraag"* ["motive for question"] and *"antwoord op de volgende vragen"* ["answers to the following questions"]. This resulted in the notes displayed in Citation 6.3.

Citation 6.3 Notes below the first two headings of #32

1	Aanleiding vraag	Motive for question
2	160.000 ha wonen, werken en	Extra 160,000 ha for living, working and
3	verkeer bijkomt	transport
3	de consequenties van dit scenario	The consequences of this scenario for the
4	voor de Ecologische Hoofdstructuur	Dutch National Ecological Network (EHS)
5	(EHS).	
6	Ze willen weten welke maatergelen	They want to know what measures the
7	het Rijk zou kunnen nemen om de	State could take to protect and/or
8	EHS te beschermen danwel uit te	expand the EHS
9	breiden.	
10	Tevens willen ze weten welke	At the same time, they want to know
11	consequenties deze maatregelen	what consequences these measures will
12	hebben voor uw provincie.	have for your province
13		
14	Antwoord op de volgende vragen:	Answers to the following questions:
15	het huidige beleid ten aanzien van	The current policy regarding the EHS
16	de EHS	
17		
18	wat de consequenties zijn van het	what the consequences are of the
19	hierboven geschetste scenario voor	scenario outlined above for the
20	de realisatie van de	realization of the policy goals
21	beleidsdoelstellingen	
22	welke maatregelen genomen kunnen	which measures can be taken to
23	worden om de realisatie van deze	stimulate the realization of these policy
24	beleidsdoelstellingen te bevorderen	goals,
25	en wat de gevolgen van deze	and what the effects of these measures
26	maatregelen zijn voor de	are for the quality of nature.
27	natuurkwaliteit	

The first heading in the advisory paper ("the current policy regarding the EHS", Citation 6.2, line 1) is the same as line 15 of the notes from Citation 6.3 ("the current policy regarding the EHS"). The second heading in the advisory paper ("2. Consequences fifth memorandum for the realization of the EHS") is derived from lines 18-21 in Citation 6.3. Apart from changing "the realization" into "realizing", the heading has been transformed in the sense that it is made both more *abstract* and more *concrete*: "the scenario outlined above" has been modified to the

more abstract term "vijfde nota", while "policy goals" is made more concrete by means of the words "realizing the EHS". Interes-tingly, the 'totem pro parte' trope is applied here: the term "vijfde nota" is used, while the author refers to only a part of the Fifth Memorandum (the expected urban expansion). The term "policy goals" is concretized as "realizing the EHS".

The headings in the notes seemed to have an effect not only on the advisory paper, but also on the process that resulted in the paper. Apart from forming the basis for the outline of the advisory paper, the notes below the headings "Motive for question" and "Answers to the following questions" helped the participant to clarify what was expected from him. After copying and pasting the relevant parts from the task description, he stated:

(P32#0:12:32) *"Ik zet hier even boven ehm aanleiding van de vraag. En dan is dit in het advies moet antwoord komen op de volgende vragen"*

["I'll, um, put motive for the question here at the top. And then it will be in the report, must have answers to the following questions."]

The notes below these headings contained a summary of the motive for the questions and the task's stock issues. As such, they constitued the reading goals for the participant.

Participant 28

Participant 28 (marker condition, without stock issues) shared approximately one third of his markings under headings that were inserted in iMarkup as categories. He tended to use these markers more often for his advisory paper than markers that were not shared under one of these headings. The headings of his advisory paper are displayed in Citation 6.4.

Citation 6.4. Headings in the advisory paper of #28

1	- Probleemomschrijving	- Problem description
2	- Consequenties	- Consequences
3	- Maatregelen	- Measures
4	- Gevolgen natuurkwaliteit	- Consequences quality of nature

For the most part, the headings follow the issues from the task description that the participant had to deal with. The part of the task description from which these issues could be derived is displayed in Citation 6.5.

Citation 6.5. Issues from the Task Description

1	Besteed in uw advies aandacht aan	In your advisory report, pay attention to issues such as the current policy regarding the EHS, what the consequences are of the scenario outlined above for the realization of the policy goals which measures can be taken to stimulate the realization of these policy goals, and what the effects of these measures are for the quality of nature.
2	zaken als het huidige beleid ten	
3	aanzien van de EHS, wat de	
4	consequenties zijn van het hierboven	
5	geschetste scenario voor de realisatie	
6	van de beleidsdoelstellingen, welke	
7	maatregelen genomen kunnen worden	
8	om de realisatie van deze	
9	beleidsdoelstellingen te bevorderen,	
10	en wat de gevolgen zijn van deze	
11	maatregelen zijn voor de	
12	natuurkwaliteit.	

The headings for the consequences, the actions and the effects of these actions (lines 2-4, Citation 6.4) can be traced back to the task description displayed in Citation 6.5. They are reduced to single words. For instance "what the consequences are of the scenario outlined above for the realization of the policy goals" is abbreviated to "consequences". Current policy regarding the EHS is not included in the headings of the advisory paper although this issue is raised in the task description. The "problem description" is added to the headings, although the task description did not specifically ask for it. Adding "Problem description" makes the headings in his advisory paper follow the conventional problem - action scheme (Schellens & Steehouder, 1990).

The headings applied to his markings relate to, but are not the same as, the headings in the advisory paper. For his markings, the following headings were created in iMarkup: "problems", "solutions", "thoughts", and "policy lnv[8]". The headings "problems" and "measures" could be traced back to the respective headings in the markings "problems" and "solutions". The other headings in the advisory paper "Consequences" and "Results quality of nature" could not be traced back to the aforementioned headings in the markings, but were derived from the task description.

For the heading "Problem description" a modification took place from markings to advisory paper in that the formulation of the heading changed in line with the *changed function* of the heading. The heading "Problems" in his markings changed into "Problem description" in his advisory paper. The plural "Problems" suggests an enumeration of problems, while "Problem description" in the advisory paper suggests the description or analysis of one or more problems. The function of the heading "Problems" is to collate the problems that have to be dealt with, while with "Problem description" in the advisory paper, the section supplied with the heading "Problem description" has the function of describing the problems and convincing the reader that indeed a problem has arisen. The terms chosen for the headings in the markings and the advisory paper thus reflect the different functions of the headings in the process.

The heading "actions" in his advisory paper was inspired by the heading "solutions" in his markings, *complying with the terms from the task description*. Both "actions" and "solutions" describe what can be done to solve the problems. Conventions regarding the scheme used to organize advisory papers or, more likely, the perceived need to comply with the term used in the task description ("measures") may have led to the decision to use that term instead of "solutions".

Participant 28 (marker condition – without stock issues) tended to use the markings that were shared under a heading more often for his advisory paper than markings that were not shared under one of these headings. The headings for the markings defined the type of issues the participant wanted to deal with in the advisory paper. Markings that could not be related to one of these issues were not included in the advisory paper.

Conclusion

In this section we analysed two cases with respect to how they transformed information from the sources to their advisory paper. We identified a number of modifications by means of which writers adapt the organization of the notes to the rhetorical situation of the advisory paper. The modification processes show that when writing the advisory paper authors engage in rhetorical reasoning for the organization of the advisory paper. Based on the analysis of participant 32 and 28, we have identified the following modifications:

[8] Lnv is the abbreviation for the Dutch department of agriculture and fisheries

1. *Abstraction* – decreasing specificity, or adding more general policy elements to the advisory paper compared to the corresponding parts in the notes taken with the marker (participant 32)
2. *Concretizing* – increasing the specificity of the heading (participant 32)
3. *Division* – dividing one heading into multiple headings (participant 32)
4. *Applying a hierarchical scheme* – placing multiple headings into multiple levels of depth (participant 32)
5. *Neutralizing* – making the tone of the heading more objective rather than opinionating (participant 32)
6. *Changing terms in line with the changed functions of headings from markings to advisory paper* – reformulating headings in the advisory paper in order to comply with the function it has within the genre of the paper (participant 28)
7. *Complying with terms from the task description* - using terms in the advisory paper that are different than those in the markings in order to comply with the terms used in the task description (participant 28)

In writing their advisory papers, the participants seek to adapt the headings from the notes to the rhetorical situation by:

- attempting to meeting the expectations of the gedeputeerde (i.e. the reader of the advisory paper) (modifications 1, 5, 6, 7)
- making the organization of the advisory paper more clear to the readers (modifications 2, 3, 4)

6.2.2 Quantitative Analysis of the Relationships between Headings in the Notes and the Advisory Paper

In this section we quantitatively analyse the types of headings used in the notes compared to the headings in the advisory papers on a higher level of abstraction.

In the notes, we make a distinction between content and process headings, while in the advisory papers we distinguish between content and functional headings. Headings in the notes may serve to collect potentially useful content for the advisory papers, or alternatively they can draw attention to the main issues the participant had to deal with. The different types of headings in the notes influence the likelihood of being incorporated in the advisory paper.

Headings in the notes

The headings in the notes were classified according to their type and subsequently counted. The marker tool is assumed to *afford* the use of headings, while this was not the case for notepad. Therefore, we tested whether differences could be found between the marker condition and the notepad condition with respect to the average number of content and planning headings. The results are shown in Table 6.4 on the next page.

Table 6.4
Average Number of Headings in the Notes Distinguished by Type and Condition

	Notepad		Marker	
	Without	With	Without	With
Planning headings	.5 (.9)	.1 (.3)	.2 (.4)	
Content headings	1.8 (2.9)	.3 (.9)	.9 (1.5)	1.1 (1.5)

Note. Standard deviations between parentheses. In the condition with stock issues, provided headings were only counted if notes were shared below the heading.

It can be seen from Table 6.4 that across conditions, few headings were created and that the participants created more content headings than planning headings.

We introduced Tool and Provided stock issues as independent variables, and the number of planning and content headings as dependent variables. No multivariate effect of tool ($F(1,37)=.63$; n.s.) or provided stock issues ($F(1,37)=1.99$; n.s.) was found. Neither was the interaction effect between tool and provided stock issues significant ($F(1, 37)=1.02$; n.s.). Between-subjects main or interaction effects were also not significant ($F(1, 37)< 2.00$; n.s.).

Headings in the advisory papers

The note-taking tool provided affected neither the number of content headings nor the number of planning headings the participants created. It could be that participants organize the information acquired from the sources during the composition process, rather than during the note-taking and reading process. Therefore, we examined the relationship between headings in the notes and headings in the advisory papers.

In contrast to the notes, all participants created headings for their advisory papers. Similar to the headings in the notes, the headings in the advisory papers were classified and counted. As explained in Section 6.1.3, we distinguish between functional headings (headings that point out the genre of the text) and content headings (headings that cover the task's most important issues). The results are shown in Table 6.5.

Table 6.5
Average Number of Headings in the Advisory Papers Divided by Type and Condition (N=38)

	Notepad		Marker	
Type of heading	Without	With	Without	With
Functional headings	1.8	1.7	1.9	1.4
Content headings	2.4	3.4	2.0	3.0

First, comparisons were made between the conditions with respect to the average number of content headings and functional headings. A multivariate analysis of variance was conducted with tool and stock issues provided as the independent variables and the number of functional and content headings as the dependent variables. No multivariate main or interaction effects

were found (F<1, n.s.). Univariate tests were also non-significant. Thus, neither the tool nor providing stock issues proved to affect the type of headings participants wrote in their advisory papers.

It may be that different individual headings occur more often in advisory papers that were written by participants in different conditions. To further analyse the headings in the advisory papers, we made a finer distinction between types of headings. Table 6.6 shows the percentage of participants who created particular types of headings.

Using univariate analyses with tool and stock issues provided as the independent variables, main effects were found for three types of headings. Participants in the condition without stock issues provided composed an explicit conclusion or advice heading more often than participants in the condition with stock issues provided ($F(1,38)=4.15$, $p=.05$). No interaction effects were found. An effect of provided stock issues was found for the presence of an explicit conclusion/advice heading and for an introductory heading.

Table 6.6
Percentage of Participants writing Headings in Advisory papers by Type and Condition (N=38)

	Note-taking		Marker		
Type of heading	Without[a]	With	Without	With	Average
Functional headings					
Title	10.0	30.0	22.2	22.2	21.1
Salutation	20.0	10.0	44.4	22.2	23.7
Motive	60.0	40.0	66.7	33.3	50.0
Introduction	20.0	60.0	11.1	33.3	31.6
Conclusions	70.0	20.0	33.3	22.2	36.8
Closing		10.0	11.1	11.1	7.9
Content headings					
Current policy	60.0	80.0	55.6	88.9	71.1
Consequences policy goals	50.0	70.0	33.3	66.7	55.3
Situation in province	60.0	80.0	33.3	33.3	52.6
Measures	60.0	70.0	44.4	66.7	60.5
Effects for quality of nature	10.0	40.0	33.3	44.4	31.6

[a] Without and with represent the conditions without and with stock issues provided.

For headings that reflect an introductory section, the effect was reversed: participants in the condition with stock issues provided wrote headings that reflected an introductory section more often than participants in the condition without stock issues provided ($F(1,38)=4,53$, $p<.05$). This result is explainable in that when an introductory section was written, it primarily contained the questions that were raised in the task description. The provided stock issues consisted of these questions in the form of keywords. Reading these issues may have triggered the writing of an introductory section in the advisory paper, which may have had the function of enhancing the participant's understanding of the task.
An effect of tool was found for headings that suggested an explicit application to the participant's own province. Participants in the notepad condition wrote headings with an application to their own province more often than participants in the marker condition ($F(1,38)=5.41$, $p<.05$).

Summing up then, mixed effects were found for different types of headings, providing evidence for an effect of tool and stock issues on the number and type of headings that participants write in their advisory papers. However, these results are difficult to interpret.

To learn about the modification process that took place between the process of note-taking and composing, we examined the differences between the headings in the notes and the headings in the advisory paper. For that purpose, we compare the average number of headings (divided by type) in the notes and in the advisory paper. The results are shown in Table 6.7.

Table 6.7
Headings in the Notes versus Heading in the Advisory Paper

	Notes		Advisory paper	
Condition	Planning	Content	Functional	Content
Notepad				
Without stock issues	.5	1.8	1.8	2.4
With stock issues	.1	.3	1.7	3.4
Marker				
Without stock issues	.2	.9	1.9	2.0
With stock issues		1.1	1.4	3.0

Of course, planning headings are only present in the notes since they reflect reading goals and composition goals, while functional headings were only found in the advisory papers since they are connected to the genre of the advisory paper.

A repeated measures analysis was conducted to test for the difference between the number of headings in the notes and the number of headings in the advisory papers. The number of content headings in notes and advisory papers was introduced as within-subjects factor, while Tool and Provided stock issues were the fixed factors. Both a multivariate and a within-

subjects effect of number of content headings was found ($F=24.58$; $df=1$; $p<.001$) as well as a number of headings x provided stock issues interaction ($F=5.89$;$df=1$; $p<.05$).
Thus, the number of content headings in the advisory paper is significantly higher than the number of content headings in the notes, while this effect is affected by the stock issues. For the conditions with stock issues provided, the difference between the number of headings in the notes and the advisory paper is larger than for the conditions without stock issues.
This difference is due to the fact that headings were not counted if they were identical to the stock issues, since this would not be a reflection of participants' own decision to create headings. For these participants, there is less need to create one's own headings (as can be seen from the lower average number). Provided headings in the conditions with stock issues were only counted if participants had assigned markings to them (marker condition), or shared notes under them (notepad condition).

While the requirements for the advisory paper were the same across conditions, the participants had to write headings that were not present in the notes or were not counted as headings, because no clauses or markings were shared under these headings. As it takes more effort to do so, it is likely that in the conditions with stock issues more content headings were present than in the conditions without stock issues.

The results suggest that, compared to headings in the notes, writers extend the scheme for the organization of the advisory paper. Participants use far more headings in the advisory paper than in the notes, indicating that they defer the organization of information for the advisory paper to the composition process.

6.2.3 Conclusion

It can be concluded that the relationship between the organization of the notes and the organization of the advisory paper is a relationship of both extension and of adaptation: compared to the organization of the notes, participants extended the scheme that is applied to organize their advisory paper, while they adapt it to the reader's needs.

Even though the note-taking tool allows writers to organize their thoughts and ideas early in the process, they defer this organization process for the main part until they start composing their advisory papers.

In conclusion, the organization of the notes cannot be perceived as a preliminary organization of the advisory paper. That is, significant reorganization processes had to be carried during composing. The extent to which knowledge-transforming behaviour can be observed from the organization of the notes is in other words rather limited.

6.3 Modifications in Content from Notes to Advisory Paper

In this section we analyse the relationship between the content of the notes and the content of the advisory papers with a focus on the modifications that took place. Our purpose is to make an inventory of these modifications. Similar to our approach in Section 6.2, we first analyse two cases in depth, after which we proceed with a quantitative analysis of the extent to which authors modify information from the sources, to the notes, and finally to the advisory paper.

Similar to our analysis presented in Section 6.2, the purpose of this analysis is to investigate the extent to which manifestations of a knowledge-telling or a knowledge-transforming approach can be found in the step from sources, to notes, and finally to the advisory papers.

6.3.1 Two Examples

In this section we examine the same two cases we have analysed in section 6.2 on the modifications of headings from the notes to the advisory paper. Now we focus on the modifications of the notes' content.

Participant 32

Participant 32 (notepad condition without stock issues) used Notepad primarily to copy citations from the sources. These citations were supplied partly with self-formulated headings. Except for the passages that were copied from the task description, almost every copied citation was included in his advisory paper. Though a large part of his notes was incorporated without modification, some citations were modified after pasting them into his advisory paper. If this was the case, the first sentence of the citation was most often modified.

The rhetorical reasoning that Participant 32 seemed to engage in when he modified headings in the notes to the headings for his advisory paper was also visible in the modifications that Participant 32 performed on the information from the sources and his notes. We illustrate these modification processes with the following three types of modifications.

- *Type 1*: Adding authorship and verba dicendi

In the following example, two modifications took place: the *author* of the document was added as well as a *verbum dicendi*. A section from *"Toets Vijfde Nota Ruimtelijke Ordening"* ("Assessment Fifth Memorandum Spatial Planning") with the heading *"Provincies verdienen extra steun in de rug bij de bescherming van natuur en landschap"* ["Provinces deserve additional support in protecting nature and landscape"] was copied to Notepad. In the resulting advisory paper, the following sentence (shown in Citation 6.6) was included in the section *"Rol van de provincie"* ["Role of the province"]:

Citation 6.6 Passage from advisory paper #32

1	Het RIVM concludeert dan ook dat	The RIVM concludes then that Provinces
2	Provincies extra steun in de rug	deserve additional support in protecting
3	verdienen bij de bescherming van	nature and landscape
4	natuur en landschap	

Interestingly, this sentence that functioned as a heading in the source document, was incorporated into the advisory paper as the concluding sentence for a section in the advisory paper. It was modified in the sense that authorship was added to the sentence as well as the verb 'concludes'. Mentioning the author could be the result of the opinion that plagiarism should be avoided. Alternatively, the participant may have wanted to strengthen his argumentation by introducing the RVIM as an authority.

The choice of the verbum dicendi "concludes" suggests that the participant has accepted the argumentation in the source documents from which he only incorporated the conclusion into his advisory paper. The argumentation is displayed in Citation 6.7.

Citation 6.7 Passage from source document "Toets Vijfde Nota Ruimtelijke Ordening" ("Assessment Fifth Memorandum Spatial Planning")

1	Zonder duidelijke criteria voor de	Without clear criteria for the limitation of
2	begrenzing van de groene contour	the green contour (such as rarity,
3	(zoals zeldzaamheid, internationale	international sigificance and vulnerability)
4	betekenis en kwetsbaarheid) en de	and the assignation and legal protection of
5	aanwijzing en wettelijke bescherming	provincial landscapes, it will be difficult to
6	van provinciale landschappen, zal het	offer resistance to the economically-
7	moeilijk zijn om tegendruk te bieden	driven functions

The opinion that provinces deserve additional support in protecting nature and rural areas is not explicitly presented as a conclusion in the sources (Citation 6.7).

- *Type 2*: Reducing the level of detail

Participant 32 (note-taking, without stock issues) modified sentences from the notes to the advisory paper by *reducing the level of detail.* In the notes, the sentence shown in Citation 6.8 was part of the section with the heading *"Natuurkwaliteit neemt toe; door versnippering blijft rendement natuurbeleid beperkt"* ["Quality of nature increases; through fragmentation, yield of conservation policy remains limited"].

Citation 6.8 Passage from notes #32

1	De globale zoekgebieden voor groene	The global search areas for green
2	contouren in de Vijfde Nota suggereren dat	contours in the Fifth Memorandum
3	er grote stukken aaneengesloten natuur	suggest that large pieces of nature,
4	zullen ontstaan.	joined together, will be formed

In his advisory paper, this sentence was transformed and shared under the heading "2.3 Risks realization EHS within the green contours" with the words:

Citation 6.9 Passage from advisory paper #32

1	De Vijfde Nota suggereert dat er grote	The Fifth Memorandum suggests that
2	stukken aaneengesloten natuur zullen	large pieces of nature, joined together,
3	ontstaan.	will be formed

In this case, the core policy concept of 'green contours' was removed, using the term "Vijfde Nota" as a whole rather than specific policy instruments from the Vijfde Nota only. In fact, the participant introduced the totem-pro-parte trope. He reduced the level of detail and thus made the sentence more abstract. The participant may have considered that the rhetorical situation required a less detailed advisory paper.

- *Type 3*: Summarizing, softening, and substituting information by a pointer

The section with the heading "Conclusions" was the only section the participant formulated himself for the main part. It is displayed in Citation 6.10.

Citation 6.10 Conclusion section from Advisory paper #32

1	4. Conclusies	4. Conclusions
2	De in de Vijfde Nota na te streven	The quality of nature to be aimed at, as
3	natuurkwaliteit is afhankelijk van de	specified in the Fifth Memorandum, is
4	schaal waarop door de provincies aan	dependent on the scale on which the
5	de ruimte bestemming wordt	provinces designate the space. The role of
6	gegeven. De rol van de provincies bij	the provinces regarding the content of the
7	de invulling van de groene contouren	green contours, and thereby the realization
8	en daarmee de realisatie van de EHS,	of the EHS, must therefore be intensified.
9	moet daarom worden versterkt.	In doing this, at the same time attention
10	Daarbij moet tevens aandacht worden	must be paid to the risks earlier identified
11	geschonken aan de eerder door het	by the RIVM related to the implementation
12	RIVM gesignaleerde risico's verbonden	of the instrument of private nature
13	aan het hanteren van het instrument	management.
14	van particulier natuurbeheer.	

The second sentence (lines 2-5) was copied from "Toets Vijfde Nota Ruimtelijke ordening". The third sentence (lines 5-8) was *summarized* from the previous section in his advisory paper on the role the provinces play in realizing the EHS, which was in turn filled with a citation from the notes. The fourth sentence (lines 9-13) was a modified version of a citation that was copied to Notepad from one of the sources ("Reactie op het hoofdlijnenakkoord" ["Response to the coalition agreement"]). This citation is shown in Citation 6.11.

This citation identified four risks of the reducing influence of the national government. In his advisory paper, this citation was used verbatim in the section "the current policy regarding the EHS". It was also modified in the conclusions section. Again, authorship was added with the words "the risks earlier identified by the RIVM" (Citation 6.10, line 10-11).

Citation 6.11 Passage from "Reactie op het hoofdlijnenakkoord ("Response to the coalition agreement")

1	De doelstelling van de EHS is	The EHS has three aims, namely the
2	drieledig, namelijk het realiseren van	realization of the EHS land, a cohesive
3	het areaal EHS, een samenhangende	EHS, and a high quality of nature. By
4	EHS met een hoogwaardige	means of a number of policy
5	natuurkwaliteit. Door een aantal	amendments, partly implemented by the
6	beleidswijzigingen, deels onder het	previous cabinet, the steering role of the
7	vorige kabinet ingezet, neemt de	central government for the realization of
8	sturing van de rijksoverheid op de	these goals has been reduced. This
9	realisatie van deze doelen af. Door	involves certain risks for realizing the
10	een aantal beleidswijzigingen, deels	envisaged EHS. The risks are:
11	onder het vorige kabinet ingezet,	- Up till now, there has been little
12	neemt de sturing van de	interest for private nature management,
13	rijksoverheid op de realisatie van	while the cabinet is striving to increase
14	deze doelen af. Dit is risicovol voor	private management (figuur 1).
15	het bereiken van de beoogde EHS. De	- With private management, the
16	risico's zijn:	government's ability to steer towards a
17	- De belangstelling voor particulier	cohesive EHS is reduced.
18	natuurbeheer is tot nu toe erg klein,	- The spatial planning policy as specified
19	terwijl het kabinet juist inzet op	in the Stellingnamebrief Nationaal
20	grotere inzet van particulier beheer	Ruimtelijk Beleid (2002) offers protection
21	(figuur 1).	to the designated but fragmented nature
22	- Bij particulier beheer kan de	reserves. It does not however guarantee
23	overheid minder sturen op een	a cohesive EHS.
24	samenhangende EHS.	- The proposal to allow the Wet
25	- Het ruimtelijk beleid zoals	ammoniak en veehouderij (2002) only to
26	verwoord in de Stellingnamebrief	be applied to very vulnerable natural
27	Nationaal Ruimtelijk Beleid (2002)	areas and no longer to vulnerable natural
28	biedt bescherming aan de nu	areas.
29	aangewezen maar versnipperde	
30	natuurgebieden. Het biedt echter	
31	geen waarborg voor een	
32	samenhangende EHS.	
33	- Het voornemen om de Wet	
34	ammoniak en veehouderij (2002)	
35	alleen van toepassing te laten zijn op	
36	de zeer kwetsbare natuur en niet	
37	meer op de kwetsbare natuur.	

Only the first two identified risks on decreasing governmental influence (Citation 6.11, lines 11-17) were selected and included in his advisory paper. These risks were incorporated in the advisory paper with the words "In doing this … private nature management" (Citation 6.10, line 9-13). Whereas in the sources the risks were presented as potential threats to the realization of the EHS' objectives, in the advisory paper the suggestion was made to "pay attention to the risks". The information from the sources is modified by *hedging:* paying attention to risks is much less a call for action than identifying threats to the realization of the EHS.

The participant may have wanted to increase the likelihood of his advisory paper being accepted by those reading it. This seems to be a process similar to that found in Van der Mast (1999), who studied the revision process for policy documents. He found that revisions often

have the purpose of achieving consensus among the authors and other stakeholders of the document. This is done through a number of different changes, including softening the claims by adding words as quoted in the previous example, referred to as *hedging*.

The third modification in this example is that the information itself is *substituted by a pointer* to the information. Whereas risks are identified in the sources, in the advisory paper reference is made to the risks that are identified by the RIVM by means of the words "the risks earlier identified by the RIVM". The hidden assumption is that the reader is familiar with the sources that the participant had used to write his advisory paper. This assumption seems to be optimistic, since the Gedeputeerde is not likely to be familiar with all texts published by the RIVM.

To summarize the use of the sources and the notes for the advisory paper in the example of Participant 32, the participant copied and pasted citations from the source documents to the notes and subsequently selected and copied (a large part of) them to the advisory paper, with or without modification. If the citations were transformed, the following types of modifications took place:

1. *Adding authorship* – referring to the author of the source and thus introducing an authority claim
2. *Adding verba dicendi* – changing the colour of the sentences and thus steering the interpretation of the reader by adding or changing verba dicendi
3. *Reducing the level of detail* – removing parts of sentences from the notes taken with the marker tool in the advisory paper
4. *Summarizing* – rephrasing the content of sentences from the notes or the sources in fewer words
5. *Hedging* – reducing the strength of the claim by adding modalities (such as uncertainty about a claim) or introducing vague terms to reduce the severity of the assertion
6. *Substituting information by a pointer to information* – removing the information from a passage from the notes to replace it with a reference to that information in the advisory paper.

Participant 28
Participant 28 (marker condition – without stock issues) used highlights and sticky notes in iMarkup to add notes to his sources. A large proportion of his markings was eventually included in a modified form in his final advisory paper. No markings were used verbatim. During the composition process, the participant kept the overview of the markings permanently visible. He brought the contents of the overview into view by floating the mouse over the marking, which results in displaying the entire note. This strategy makes it easy to combine information from markings from different documents. In using the markings for his advisory paper, the participant conducted a number of modifications, examples of which are shown below:

- *Type 1*: modifying examples from sources to catchphrases

The participant transformed examples from the *sources* to *catchphrases* in his sticky notes and subsequently to examples of policy measures in his advisory paper. For instance, he put a sticky note with the term *"ruimte voor ruimte"* ["space for space"] next to the following source passage (Citation 6.12).

Citation 6.12 Passage from source document *"Rode functies in de EHS"* ("Red functions in the EHS")

1	De sloop van bebouwing op kwetsbare	It is proposed to finance the demolition of
2	plaatsen op de Heuvelrug wil men	buildings at vulnerable locations on the
3	financieren uit een verdere	Heuvelrug from a further development of
4	ontwikkeling van reeds aanwezige	already existing red functions at other
5	rode functies op andere plaatsen op	locations on the Heuvelrug that are not
6	de Heuvelrug die geen deel uitmaken	part of the EHS. On balance, the amount
7	van de ecologische hoofdstructuur.	of red on the Heuvelrug should decrease
8	Per saldo zou de omvang van het rood	
9	op de Heuvelrug moeten afnemen.	

In his advisory paper, below the heading "*Maatregelen"* ["Measures"] he stated:

Citation 6.13 Section "Maatregelen" ("Measures") in advisory paper #28

1	2.Saneren ongewenste bestemmingen	Cleaning up of unwanted developments
2	d.m.v. financieringsconstructies als	through the use of financing
3	Ruimte voor ruimte en Rood betaalt	cinstructions such as Space for Space,
4	voor groen	and Red pays for Green

The participant distilled a general policy measure from an example in the sources while at the same time using this measure as an example of how to deal with one of the problems described in his advisory paper. Which problem this particular action is a solution for, is unclear as the section Measures is an enumeration of potential actions that are not connected to the corresponding problems.

- *Type 2*: hedging and reducing the level of detail

The first section of the advisory paper with the heading "Problem description" shows a variety of different modifications. The section, which briefly describes the current policy as well as the problems with the EHS, is displayed in Citation 6.14.

Citation 6.14 Problem description from advisory paper #28

1	Probleembeschrijving	Problem description
2	Het Rijksbeleid t.a.v. de EHS is	Government policy regarding the EHS is
3	helder verwoord. Rijk heeft bruto	clearly expressed. Government has
4	EHS aangegeven. Provincies hebben	specified gross EHS. Provinces have
5	dit inmiddels vertaald in netto EHS	already translated into net EHS by means
6	middels natuurgebiedsplannen.	of nature reserve plans.
7	In principe is voldoende geld (op	In theory, sufficient money (in the long
8	termijn) beschikbaar. Realisatie is	term) is available. Realisation is,
9	desondanks een probleem vanwege:	however, a problem due to:
10	1. bestaande natuur wordt aangetast	1. Existing nature will be damaged by red
11	door rode functies (wonen)	functions (living)
12	2. Saneren van ongewenste	2. Cleaning up of unwanted
13	bestemmingen loopt nog niet	developments hasn't started yet due to
14	vanwege gebrek aan beleid/gelden	lack of policy/funds
15	3. potentiele natuurgebieden worden	3. Potential nature reserves are being
16	ingenomen door rode functies	taken up by red functions
17	4. Natuurkwaliteit	4. Quality of nature (environmental
18	(milieudoelstellingen) wordt niet	goals) will not be achieved
19	gehaald	

The first three sentences ("Government policy… nature reserve plans", lines 2-6) contain the description of the current policy. No markings were used for these sentences. Although the participant created a category 'policy lnv', no markings that were assigned to this category were used in his advisory paper.

The phrase "is clearly expressed" (line 2-3) is a qualification of either the policy itself or the description of the policy in the sources. In this case it is unlikely that the participant has acquired his knowledge on the national policy from the sources, as the description of the policy is spread over multiple documents, which makes it unlikely that "clearly expressed" refers to the description of the policy in the sources. It is most likely that he used his prior knowledge about the policy as the basis for this qualification.

The sentence "In theory…available" (line 7-8) is derived from a highlight in one of the sources. That document stated *"Daarmee is voldoende geld beschikbaar om het voor de komende kabinetsperiode beoogde areaal te realiseren"* ["In this way, sufficient money is available to realize the envisaged area in the coming cabinet period"].

The sentence was modified in the sense that *hedging* took place. The participant accepted the claim made by the author of the source document that sufficient money was available, but softened it by adding "in the long term" and "in theory" to that sentence. In other words, a sense-modality was added to the claim by introducing uncertainty about whether indeed sufficient money is available or not.

The second modification was *reducing the level of detail* by removing the adverbial clause that indicated the destination of the money ("to realize the envisaged area in the coming cabinet period"). As a result, in his advisory paper it is unclear for which purpose enough money is available. As the description of current policy in his advisory paper is rather short, the participant may have assumed that the reader of the paper possessed sufficient prior knowledge so that not every aspect needed to be explained in detail.

- *Type 3*: abstracting, dividing, and complying with terms from the task description, reducing the level of detail, problematizing, anticipating on a potential conclusion

After describing the current policy, he proceeded with describing the problems with the EHS in short phrases. The first, second, and fourth problems were based on his markings. The first problem (*"bestaande natuur wordt aangetast door rode functies (wonen)"* ["Existing nature will be damaged by red functions (living)"]) is based on the following highlighted passage:

Citation 6.15 Highlighted passage from "Rode functies in de EHS" ("Red Functions in the EHS")

1	Wel moet worden geconstateerd	It has to be said though that the proportion
2	dat het aandeel woningen dat in de	of houses that has been built in the past
3	afgelopen tien jaar in de 'bestaande	ten years in the existing nature
4	natuur 1990/begrensde EHS' is	1990/limited EHS, compared with the
5	gebouwd, ten opzichte van de	period 1980-1990, has increased.
6	periode 1980-1990 flink is	

Participant 28 (marker – without stock issues) again transformed the sentence by making it more *abstract*. He removed the time span, while the term "proportion of houses" was replaced by the more abstract policy term "red functions". The reason for this may be that the participant wanted to make a connection to the background and terminology of the Gedeputeerde, which would be an interpretation of the rhetorical situation.

The second problem ("2. Cleaning up…policy/funds") was mentioned in the docu-ment "Rode functies in de EHS" ("Red Functions in the EHS"). The corresponding paragraph stated:

Citation 6.16 Passage from source document "Rode functies in de EHS" ("Red functions in the EHS")

1	Om de EHS goed te kunnen	To protect the EHS effectively, in addition
2	beschermen, is naast ruimtelijke	to spatial protection, spatial cleaning up is
3	bescherming ook ruimtelijke	needed. The EHS policy does not allow for
4	sanering nodig. Het EHS-beleid	buying out of unwanted red functions from
5	voorziet niet in het uitkopen van	nature. At regional level, therefore,
6	ongewenste rode functies uit de	initiatives have recently been started up to
7	natuur. Op regionaal niveau	finance the cleaning up of red functions at
8	ontstaan de laatste tijd daarom	vulnerable locations through the
9	initiatieven om sanering van rode	development of red functions at other (less
10	functies op kwetsbare plaatsen te	vulnerable) locations. These and other
11	financieren met ontwikkeling van	initiatives have lately started to become
12	rode functies op andere (minder	categorized under the term 'development
13	kwetsbare) locaties. Deze en andere	planning'.
14	initiatieven worden de laatste tijd	
15	onder de noemer 'ontwikkelings-	
16	planologie' geschaard.	

Next to this section, a sticky note was placed with the remark *"Wie betaalt?"* ["who will pay?"]. Later *"rood voor groen"* ["red for green"] was added, a catchphrase referring to one solution for the problem described in the source passage. He verbalized:

(P28#07:17) *"Ja wie betaalt? Rood betaalt eh dus eh rood voor groen is 't eigenlijk he. Eventjes erbij zetten."* ["Yes, who will pay?. Red will pay, um, so, um it's really red for green isn't it. I'll just put that in."]

Two modifications have taken place from the notes to the advisory paper. The seemingly rhetorical question "who will pay" in his sticky notes is reformulated from a question to the phrase "due to lack of finances". The phrase "red for green" is not used in this section, but is used in the section "Measures". The modification that took place is *division*: a sticky note is divided into two parts, which are used in different parts of the advisory paper.

The fourth problem ("Quality of nature (environmental goals) will not be achieved") is based on two highlighted passages from the document "Response to the coalition agreement" that were shared under the heading "problems" (Citation 6.17 and 6.18):

Citation 6.17 Highlighted passage from source document "Reactie op het Hoofdlijnenakkoord" ("Response to the Coalition Agreement")

1	Het huidige beleid is niet voldoende	The current policy is not sufficient to
2	om overal in Nederland aan de EU-	ensure that the EU limit value for NO_2 and
3	grenswaarden voor NO2 en fijn stof te	fine particles is complied with throughout
4	voldoen. Met name op drukke	the Netherlands. Particularly in very busy
5	verkeerslocaties in stedelijk gebied	traffic areas in urban areas, exceeding of
6	blijven overschrijdingen van de	the European NO_2 limit will keep occurring
7	Europese NO2-grenswaarde ook in de	in the future
8	toekomst vóórkomen.	

Citation 6.18 Highlighted passage from source document "Reactie op het hoofdlijnenakkoord" ("Response to the coalition agreement")

1	De bezuiniging op milieu komt	The cutbacks in environment have largely
2	grotendeels voor rekening van het	taken place in the energy and climate
3	thema energie en klimaat. Er blijkt	sectors. There appears to be less money
4	onder andere minder geld nodig voor	required for, among other things, the
5	de aankoop van emissiereducties in het	purchasing of emission reductions abroad,
6	buitenland, waarmee Nederland een	whereby the Netherlands is achieving part
7	deel van de Kyoto-verplichting	of its Kyoto obligations.These emission
8	realiseert. Die emissiereducties blijken	reductions appear to be higher than has
9	goedkoper dan tot nu toe begroot.	been budgeted.

The citations address the topic of emission rather than the topic of "quality of nature", as eventually formulated in his advisory paper. In the task description, quality of nature was explicitly mentioned as one of the issues that the participant had to deal with. Thus, he transformed the topic from "quality of nature" to emission in order to *comply with the terms from the task description.*

The second modification was that he *reduced the level of detail* by leaving out which targets could not be met (i.e. the EU targets) as well as the financial advantages of buying emission reductions elsewhere.

The same passages of Citation 6.17 and 6.18 on the theme of "environmental quality" were also used in the section "Effects for quality of nature", in which the intended effects of his suggested actions were estimated. Thus, he used these markings to identify the problem in the section "Problem description" and to argue that additional measures are necessary in order to meet the targets in the section "Effects for quality of nature". The participant argued:

Citation 6.19 Passage from advisory paper #28

1	Milieukwaliteit blijft een probleem.	Environmental quality remains a problem.
2	Compensatie in buiteland (CO2	Compensation abroad (CO_2 fixing) is too
3	vastlegging) is te goedkoop! Beleid	cheap! Develop policy in order to achieve
4	ontwikkelen om dit toch in eigen land	this in own country!
5	te realiseren!??	

The participant reformulated two relatively factual paragraphs from the sources (Citation 6.17 and 6.18) to three short, condensed persuasive sentences in his advisory paper. The first sentence "Environmental quality remains a problem" is transformed from the markings in the sense that in the advisory paper the assessment of the current policy ("The current policy…the Netherlands", Citation 6.17) in the markings is *problematized* in the advisory paper.

"Compensation…cheap" anticipates on a conclusion that can be drawn based on the passage displayed in Citation 6.18. One could easily argue that buying CO_2 reductions that have been shown to be less expensive than expected releases the Gedeputeerde from the obligation to develop its own policy to reduce CO_2 emissions.

The author modified the factual statements in the sources on the financial benefits of buying reductions to an argumentative *anticipation on a potential conclusion* in the advisory paper. The last sentence ("Develop…country") is an appeal for action to develop additional policy substantiated by the two preceding sentences that identified the problem ("environmental quality) and rejected a potential solution (buying reductions).

The third problem ("potential nature reserves are being taken up by red functions") was not based on his markings. The participant wrote out that section without referring back to his markings. He may either have derived that problem from his prior knowledge or he may have paraphrased what he had read in the sources. The second explanation is unlikely as the sources do not explicitly address the problem of construction in potential nature reserves.

Not all markings were used for the advisory paper. The markings also seemed to have an encoding function (see Section 1.3.2) in the sense that they helped the participant to understand the information he was reading. For instance, a sticky note was also used to paraphrase information from two graphs from "Response to the coalition agreement". The graphs represent the discrepancy between goals and realization with respect to the growth of different types of nature conservation. Next to two graphs in "Response to the coalition agreement" with the remark *"bestaande natuur ok. Alleen kwetsbare natuur"* ["existing nature OK. Only vulnerable nature"]. The sticky note was placed next to the graphs, but referred also to the textual passage above the graphs. The sticky note helped the participant to understand the information from the graphs and to relate this information to the text. This sticky note was not incorporated in his advisory paper. It is displayed in Citation 6.20 on the next page.

Citation 6.20 Sticky note added to "Reactie op het hoofdlijnenakkoord" ("Response to the coalition agreement")

1	Het voornemen om de Wet ammoniak en	The proposal to allow the Wet ammoniak en
2	veehouderij (2002) alleen van toepassing	veehouderij (2002) only to be applied to
3	te laten zijn op de zeer kwetsbare natuur	very vulnerable natural areas and no longer
4	en niet meer op de kwetsbare natuur.	to vulnerable natural areas.

To recapitulate, Participant 28 (marker condition – without stock issues) used a large proportion of his markings for his advisory paper, while some markings helped the participant to process the information. When the markings were used for the advisory paper, they were transformed in a number of ways:

1. *Anticipating on potential conclusions* – preventing the reader from drawing conclusions that can be drawn based on the markings
2. *Modifying information from examples to catchphrases to examples* – generalizing from examples in the sources to catchphrases suggesting policy actions, to examples of how more general policy instruments can be applied
3. *Reducing the level of detail* – removing parts of sentences from the markings in the advisory paper
4. *Hedging* – reducing the strength of the claim by adding modalities (such as uncertainty about a claim) or introducing vague terms to reduce the intensity of the assertion
5. *Abstracting* – decreasing specificity, or adding more general policy elements to the advisory paper compared to the corresponding parts in the markings
6. *Problematizing* – identifying the current state of affairs as laid out in the markings as a problem in the advisory paper
7. *Complying with terms from the task description* – using terms in the advisory paper that are different from those used in the markings in order to comply with the terms used in the task description.
8. *Dividing* – using parts of markings for different parts of the advisory paper

Conclusion

In the examples of participant 28 and 32 the relationship between the notes and the advisory paper was found to be relatively strong as can be seen from the large proportion of the notes that was ultimately incorporated into the advisory paper. The extent to which notes are used for the advisory paper differs between participants with respect to how, and to what extent the notes are transformed.

If the extent to which information is modified is considered an indication of whether participants engage in a knowledge-telling or a knowledge-transforming process, it can be concluded that participant 32 was engaged more in knowledge-telling approach, while participant 28 was engaged more in a process of knowledge-transforming.

Participant 32 (notepad condition – without stock issues) sometimes selected information, rearranged it, added authorship or colour to the information, or reduced the strength of the assertion. He extensively used source material verbatim in his advisory paper, which is characteristic for a knowledge-telling approach.

In contrast, Participant 28 transformed knowledge more frequently by paraphrasing information first in notes and then adapting the information to the current rhetorical situation in the advisory paper. For instance, he anticipated on the readers' reactions (anticipating on potential conclusions, complying with terms from the task description, hedging) and transformed factual statements to persuasive statements (problematizing, transforming to examples). Participant 28 formulated his advisory paper almost entirely himself by paraphrasing and adapting information to the situation at hand.

6.3.2 Quantitative Analysis of Modifications

The two cases we analysed in the previous section shed light on the modification processes that authors applied to information from the sources. However, the extent to which participants transformed information remains to be investigated. For that reason, in this section we will analyse the modification processes on a more general level. We address the extent to which information from the sources is modified from the notes to the advisory paper.

The degree to which the notes were used for the advisory paper was analysed by first computing the number of clauses that were directly copied from the sources to Notepad or the advisory paper as well as the number of clauses that were paraphrased from the sources. Next, the use of the clauses for the advisory paper was determined. They could either have been copied from the notes, paraphrased from the notes, or not used at all. Finally, for each possible use, the percentage of the total number of clauses in the notes was computed.

Use and Modifications of the Notes in the Marker Condition
For the notepad condition, the results are displayed in Table 6.8.

Table 6.8
Percentage of Clauses Used for the Advisory Paper Divided by Condition, Origin, and Type of Use (Notepad Condition)

Origin	Use in advisory paper	Stock issues			
		Without (N=10)		With (N=10)	
Copied from sources to Notepad	Used verbatim	-		-	
	Paraphrased	-		-	
	Not used	-		3.6	(100.0)
			(100.0)	3.6	(100.0)

Table 6.8 (*Continued*)

Origin	Use in advisory paper	Stock issues			
		Without (N=10)		With (N=10)	
Paraphrased from sources in Notepad	Used verbatim	1.9	(5.1)	-	
	Paraphrased	-		-	
	Not used	35.2	(94.9)	-	
		37.1	(100.0)		(100.0)
Copied from sources to advisory paper	Used verbatim	33.3	(52.9)	40.9	(42.4)
	Paraphrased	-		5.3	(5.5)
	Not used	29.6	(47.1)	50.2	(52.1)
		62.9	(100.0)	96.4	(100.0)
Total		*100.0*		*100.0*	

The results from Table 6.15 show that in both notepad conditions, little or no part (5.1%) of the notes that were paraphrased from the sources were used in the advisory paper. This can be explained by the contents of these notes: in general, the notes labelled as 'paraphrased from source' are paraphrases of the task. Paraphrasing the task had the function of achieving an understanding of the task. As such, they had an encoding function rather than an external storage function (in terms of Di Vesta & Gray, 1972), which makes it less likely that they were incorporated into the final advisory paper.

The participants in the condition without stock issues copied passages immediately to the advisory paper, approximately half of which (52.9%) is used in the advisory paper. In this condition, no modifications took place between the notes and the eventual advisory paper, as indicated by the empty column 'Paraphrased'. Thus, participants either used the notes, or they copied passages verbatim, or they did not use the notes at all.

In the notepad condition with stock issues, on average more than half of the clauses in the notes (53.8%) was not used for the advisory papers. The vast majority (96.4%) of the clauses in the notes were clauses that were copied directly from the sources to the advisory papers, while the remaining 3.6% of the clauses contained clauses that were copied from the sources to Notepad. No clauses were paraphrased in Notepad. Of the clauses that were copied from the sources to the advisory paper, only 5.5% were paraphrased after copying the clauses to Notepad, using the original formulation in 42.4% of the clauses.

In contrast to participants in the notepad condition without stock issues provided, participants in the condition with stock issues did not paraphrase information from the sources in their notes, whereas in the condition without stock issues participants took notes that were paraphrases in 37.1% of the total number (Table 6.15).

The content of the paraphrases may be responsible for this result. Whereas participants in the notepad condition without stock issues used the paraphrases to achieve an understanding of the task, in the notepad condition with stock issues the task's stock issues had already been inserted in Notepad. Reading these issues could have been sufficient to comprehend the task, removing the necessity for the participants to derive them from the task description themselves and to write them down in Notepad.

To conclude then, when participants in the notepad condition used their notes for their advisory papers (which was the case in approximately half of the clauses), they modified the clauses in their notes to only a small extent. Thus, the step from notes to advisory paper primarily consisted of selecting the notes to be used for the advisory paper.

Use and Modifications of the Notes in the Marker Condition

In Table 6.9 the use of the markings for the advisory paper is. A distinction is made between the different features of iMarkup.

Table 6.9

Percentage of Clauses Used for the Advisory Paper Divided by Condition, Origin, and Type of Use (Marker Condition)

		Stock issues			
Origin	Use in advisory paper	Without		With	
Copied from source (highlighted)	Used verbatim	20.8	35.7	6.9	22.7
	Paraphrased	1.3	2.2	1.3	4.3
	Not used	36.2	62.1	22.2	73.0
		58.3	(100.0)	30.4	(100.0)
Paraphrased from source (added comments)	Used verbatim	-			
	Paraphrased	-		.6	14.6
	Not used	-		3.5	83.4
		-	(100.0)	4.1	(100.0)

Table 6.9 (*Continued*)

Origin	Use in advisory paper	Stock issues: Without		With	
Paraphrased from source (sticky note)	Used verbatim	-		-	
	Paraphrased	20.0	70.7	.9	5.9
	Not used	8.3	29.3	14.3	94.1
		28.3	(100.0)	15.2	(100.0)
Copied from source to advisory paper	Used verbatim	1.3	9.7	34.8	69.2
	Paraphrased	3.3	24.6	6.3	12.5
	Not used	8.8	65.7	9.2	18.3
		13.4	(100.0)	50.3	(100.0)
Total		*100.0*		*100.0*	

A number of observations can be made from Table 6.9 regarding the use of sources and notes for the advisory paper, and the extent to which authors engage in knowledge-transforming.

On average 58.3% and 30.4% of the clauses in the markings were highlights. Only a few comments were added to the highlights in the condition with stock issues, whereas no comments were added in the condition without stock issues. In the marker condition, highlighting is the note-taking activity that is carried out most often, not only in terms of the number of instances (as shown in Section 5.3.3), but also in terms of the percentage of clauses. Apparently, iMarkup has a strong affordance, stimulating users to engage in highlighting activities.

Of all clauses in the markings, on average 28.3% (without stock issues) and 15.2% (with stock issues) were sticky notes. The sticky notes contained only paraphrases. As expected, participants did not copy passages from the sources to their sticky notes as highlighting seems to be much more convenient for drawing attention to certain passages. Highlighting only required selecting a passage and pressing a button, while copying a citation to a sticky note required placing and resizing a sticky note, selecting, copying, and finally pasting a citation.

Participants used the sticky notes more than they used the highlights for their advisory papers. Of the sticky notes, 70.7% were used for the advisory papers, while 37.9% (35.7 + 2.2) of the highlights were used for the advisory papers.

As writing sticky notes requires more effort in terms of thinking, and using the interface, participants may have considered the potential use of a sticky note more deliberately beforehand, leaving fewer clauses from the sticky notes unused.

Table 6.9 also shows that the extent to which writers modify information in the notes is relatively limited. Only 28.3% and 19.3% (15.2+4.1) of the clauses in the markings did not draw on the original formulation in the sources, but contained paraphrases or other comments triggered by reading the sources. The clauses in the markings that were self-formulated were only incorporated into the advisory papers to a small extent (14.6% and 5.9%).

A large share of the highlighted clauses (62.1% and 73%) remained unused while composing the advisory paper. Participants may have used highlights as a preliminary means of selecting information, an approach we found when analysing the triggers and purposes of note-taking in Section 5.5.2. The result of this approach is that a large proportion of the highlights remains unused.

In comparing the marker conditions with and without stock issues provided, a number of differences can be found. First, in the marker condition without stock issues provided, the percentage of clauses used from the sticky notes is higher. In the marker condition without stock issues provided, 70.7% of the total number of clauses in the sticky notes were used, while sticky notes were not used at all in the marker condition with stock issues provided.

The passages that were copied from the sources directly to the advisory paper were used less in the marker condition without stock issues provided (34.3%) than in the marker condition with stock issues provided (81.7%). Of the passages that were used for the advisory paper, participants in the marker condition without stock issues modified a larger percentage of the clauses (24.6%) than participants in the marker condition with stock issues provided (12.5%).

The difference in the extent to which passages were modified is not striking. As compared to the condition with stock issues provided, participants in the marker condition without stock issues were less selective in what to include in the advisory paper, leaving more clauses unused. The passages that were copied from the sources and were considered not to be directly useful, could either be adapted in order to make them suitable for the particular context, or they were able to be removed from the advisory paper. This may provide an explanation for the result that fewer copied clauses were included in the eventual advisory paper and that more clauses were modified.

To summarize then, as with the notepad condition, approximately half of the clauses in the notes were used in the advisory papers. Apart from the sticky notes in the condition without stock issues, the extent to which the markings were used was rather limited. The largest proportion of the clauses in the markings were copied directly from the sources to the advisory paper, while these clauses are used to a larger extent in the condition with stock issues than without stock issues.

Source of Passages in the Advisory Papers

In the previous section, the use of the notes for the advisory papers was discussed, with the notes as the starting point. Now we take another perspective. The origin of the clauses in the advisory papers now becomes the focus of our attention. The question is then: to what extent did the authors use the sources, the notes and their prior knowledge to compose their advisory papers? In this section the source of the sentences in the advisory papers is traced back to their origin. This could be the sources, the notes or the participant's prior knowledge. In table 6.10 the source of the clauses in the advisory papers is outlined.

Table 6.10
Source of Clauses in the Advisory papers by Condition (N= 4 x 3)

Source	Note-taking		Marker	
	With stock issues	Without stock issues	With stock issues	Without stock issues
Notes		1.7	47.6	6.5
Copied from source	11.9	41.9	1.8	27.0
Copied from source then paraphrased	1.1	2.3	2.4	4.5
Paraphrased from source	30.0	8.0	7.9	7.3
Prior knowledge	57.1	46.2	40.4	54.8
	100.1a	*100.1*	*100.1*	*100.0*

[a] Rounding differences make the sum of the percentages exceed 100% by .1

As can be seen from Table 6.10, prior knowledge and passages that were copied from the sources account for the largest proportion of the clauses in the advisory papers. Across the conditions, at least 40.4% of the clauses in the advisory papers were derived from prior knowledge. The expertise of the participants (which was a selection criterion for participants) seemed to enable them to partly draw on prior knowledge to compose the advisory paper.

Between 1.8% and 41.9% of the clauses were copied directly from the sources and included in the advisory paper without modification. Compared to the marker condition in the notepad condition, more clauses that were copied directly from the sources were incorporated in the advisory papers verbatim, whereas participants to which stock issues were provided tended to use fewer clauses in their advisory paper than participants to which no stock issues were provided. As participants barely used Notepad, they skipped the additional step from sources to advisory paper. Without an additional selection decision needing to be made, the passages were immediately included in the advisory paper, whereas in the marker condition participants could highlight information first (the feature used most), consider its usefulness later on in the process, and thus decide whether or not to incorporate the citation in the final advisory paper.

Thus, both providing stock issues and providing a marker tool seemed to result in less passages being incorporated verbatim. This result suggests that providing stock issues and a tool that affords a pre-selection of information results in a more selective copying-and pasting process.

The importance of the tool for the source of clauses in the final advisory papers differs between the conditions. In the notepad condition, few clauses that were written in or copied to Notepad were used for the advisory paper. In the marker condition, the use depended on whether stock issues were provided or not. In the advisory papers, on average only 6.5% of the clauses were derived from the markings in the condition without stock issues provided,

whereas in the condition with stock issues provided, 47.6% of the clauses in the advisory papers were derived from the notes.
In their advisory papers, participants in the notepad condition without stock issues tended to paraphrase more information from the source without using a tool as an intermediate step than in the other condition. In the notepad condition without stock issues, 30% of the clauses in the advisory paper were paraphrased directly from the source documents, while in the other conditions at most 8% of the clauses were paraphrased directly from the sources.

6.4 Conclusions

Focusing on modifications, in this chapter the use of the sources and the notes has been explored both qualitatively and quantitatively. We have investigated the relationship between the notes and the advisory paper in terms of organization and content with a focus on the use of the notes and the modifications that took place. From our analyses, the following conclusions can be drawn:

- *Writers engage in rhetorical reasoning by means of various modifications, even though the extent to which they do so is relatively limited*

In this chapter it was found that in composing their advisory papers, participants combined their prior knowledge with information that was copied verbatim from the sources. The most important strategy was to either select useful passages that were copied directly to the advisory papers (all conditions) or to copy useful passages to the advisory paper that had first been highlighted in the sources (marker condition). The inventory of different types of modifications has shown that even though information may be used verbatim for the main part, slight modifications change the tone (for instance by adding modalities) and the persuasive strength of the copied passages (for instance by adding an authority claim).

Thus, although the figures suggest that participants primarily tell knowledge, they transform knowledge to the extent that such slight modifications make the passages fit the rhetorical situation. In that sense, writers engage in a knowledge-transforming approach.

- *In particular in the notepad condition, large parts of the content in the notes remain unused, which strengthens our belief that the encoding function of note-taking is as important as the external storage function*

The limited use of the notes in notepad was primarily caused by the contents of the notes: the notes consisted of parts from the task description that were either paraphrased or copied verbatim. These parts were not incorporated in the advisory paper, which seems to reinforce our conclusion from Chapter 6 that the notes in notepad primarily fulfilled the encoding function of enhancing the participant's task comprehension.

In the marker condition, a larger proportion of the notes is used, since apart from the purpose of facilitating task comprehension, participants also used the notes to pre-select information for the advisory paper. Part of this often-highlighted information was incorporated into the advisory papers.

- *Headings do not only organize the information to be used for the advisory paper, but they also fulfil a planning function.*

An important element of the headings in the notes – both in the two examples and in the analysis of the twelve cases – were headings that served a planning and monitoring function. These headings helped the participants to keep focused on the task and to know what was expected from them. As such, they fulfilled a planning function.

- *The sources and the notes have a significant influence on, but do not exclusively determine the content of the advisory paper*

Since half of the clauses in the advisory paper have their origin in the prior knowledge of the writers, we can conclude that prior knowledge is equally important as the notes and the sources. Research on professional reading suggests that prior knowledge guides the process. The origin of clauses in the advisory papers show that prior knowledge is not only important in professional reading, but also in professional writing-from-sources.

The inventory of modifications, the use of notes, and the origin of clause in the advisory paper suggest that writers are able to combine notes, copied source material, and prior knowledge in such a way that the resulting composition meets the rhetorical goals the writer has constructed from the task description. This is a demonstration of the expert nature of the writing-from-sources process.

Note-Taking Related to Advice Quality

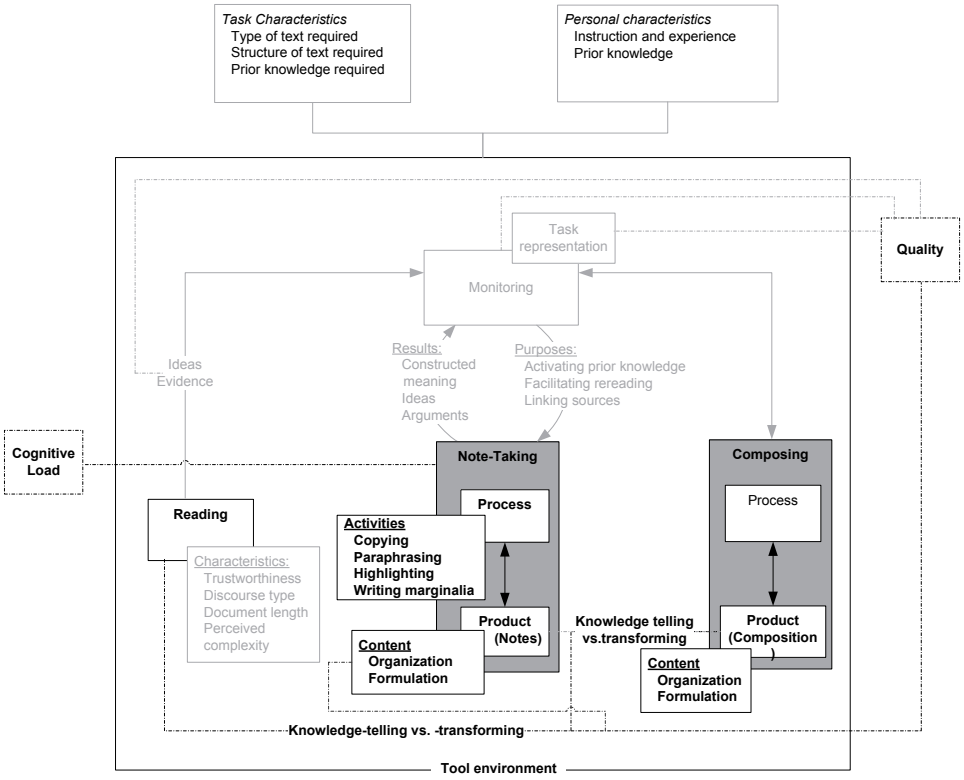
Chapter 7

7.1 Introduction

As we observed in Section 1.6.6, most studies on writing-from-sources do not pay any attention to the quality of the resulting composition. If quality is addressed, textual measures are most often used such as the number of connectives. In this chapter we take a holistic perspective on quality to try to assess the effectiveness of certain approaches to taking notes. In contrast to much of the previous research, we do not operationalise composition quality into textual measures, but construct a quality measurement of the advisory paper as a whole.

The relationships that are the topic of our investigation in this chapter are depicted in our writing-from-sources framework in Figure 7.1.

Figure 7.1 Writing-from-sources framework with the focus of Chapter 7 emphasized



As can be seen from Figure 7.1, we investigate the relationship between advice quality and the framework components that were investigated in detail in Chapters 4 through 6:

1) The *process* (how writers take notes)
2) The *product* (how they use the notes)
3) The *tool environment*
4) The *cognitive load*

Before we can address these relationships, we have to determine the quality of the advisory papers. In contrast to previous research on writing-from-sources, we do not want to take educational measures such as comprehension or recall of the sources as indicators of composition quality. After all, learning effects are less relevant within a professional context. Within this context, it is more suitable to address the appreciation for the advisory paper in terms of whether it suits the needs of the reader. That is, whether it accomplishes its rhetorical goals.

Therefore, we developed a rating procedure in which three communication experts and three domain experts rated twelve selected advisory papers. These papers were written in the same processes as we selected for the process analyses (presented in Chapters 5 and 6).

Previous attempts at assessing text quality have shown that in judging papers agreement between raters (or teachers) cannot be taken for granted (for instance, Meuffels, 1985). Therefore, we will first outline the methodology of our analyses in Section 7.2, followed by an assessment of the extent to which experts agree on advice quality. We then explore the relationship between notes and advice quality in the subsequent sections.

7.2 Assessing Advice Quality

To be able to draw conclusions about the relationship between taking notes and advice quality, a procedure had to be developed that resulted in a quantitative measure of advice quality. In this section we will first outline the method that was followed to measure advice quality, followed by a presentation of the rating outcomes.

7.2.1 Method

In order to analyse the relationship between the process and the product characteristics of note-taking, a procedure had to be developed that assessed the quality of the advisory papers.

But what exactly is writing quality and how should this be measured? In research, there is considerable debate on whether researchers should evaluate texts based on a number of dimensions (analytic rating) or based on a single holistic rating. Pointing out the relevant dimensions of advice quality is difficult as this may be dependent on both the text to be written and on the individual who is reading the text. Although we were able to derive some indicators of advice quality from handbooks on advisory reports (such as a clear problem description, and a clear argumentation of potential measures, i.e. Berkenbosch, 1991; Houët & Teeling, 2002), no substantial evidence for the construct validity of these indicators is available. Asking raters to assess the advisory papers on a number of dimensions that have been selected without sound empirical evidence on their construct validity would not seem a very sensible step. Consequently, analytic rating would not appear to be feasible.

Holistic ratings can be an alternative for analytic rating. Holistic ratings by experts are often used because they are efficient and can encompass the complex multidimensional nature of most performance tasks (Slater & Boulet, 2001, p. 103). Because holistic ratings provide

levels of reliability and validity that are comparable to that of analytic ratings (Slater & Boulet, 2001, Bacha, 2001), we chose to have the advisory papers rated in a holistic manner.

We developed a procedure that provided a holistic judgment on the quality of the advisory papers from the twelve cases. These particular cases were chosen because extensive process data is available for these cases, the results of which were described in Chapters 4 through 6. Three communication experts and three domain experts were willing to participate in this process, with each of them rating the twelve advisory papers independently. The three communication experts were lecturers in the Department of Technical and Professional Communication at the University of Twente, teaching oral and written communication skills, and are therefore accustomed to reading and judging advisory papers on a regular basis.
The three domain experts were employees of the National Institute for Public Health and the Environment, whose work is strongly related to the task's topic. In rating the papers, the communication experts were expected to focus more on structure, style, and argumentation, while the domain experts were expected to focus more on the content of the advisory papers.

To have the experts assess the papers, we developed a rating procedure that consisted of the following steps:

1. Assigning the importance of general advice quality criteria on a five point-scale.
2. Rating the twelve individual advisory papers.
3. Indicating which three criteria influenced the rating for each individual paper most.
4. Providing an overall rating for the twelve advisory papers taken as a whole
5. Answering background questions on expertise, and their experience of rating the advisory papers.

Importance ratings
Since different raters are likely to focus on different aspects of the advisory paper, we asked the raters to provide an indication of what they considered important in order to facilitate the interpretation of the results. For this purpose a twelve-item list of advice quality aspects was used. Although it is not sufficiently clear which aspects exactly constitute advice quality, some criteria are available from how-to literature that provide an *indication* of what is important in writing an advisory paper.

How important each of these criteria are for the raters, does probably influence the rater's judgments. Differences in importance rankings can be used to explain possible differences between individual raters as well as between the two different groups of raters, since it was expected that they would focus on different aspects of advice quality. Therefore, before rating the individual advisory papers, the raters were asked to rank the importance of twelve general criteria for advisory papers on a scale from 1 (low) to 5 (high). The list of criteria was derived from how-to literature on advisory papers and policy reports (Berkenbosch, 1991; Houët & Teeling, 2002). Three categories of criteria emerged from the literature: usefulness, readability, and argumentation. The criteria regarding usefulness were:

1. Advisory reports must give a complete answer to the questions of the Gedeputeerde
2. Advisory reports must propose measures that the reader can implement immediately
3. Advisory reports must properly take into account the political situation in which the reader finds him-/herself
4. Advisory reports must propose measures that are acceptable for the reader

The criteria regarding argumentation were:

5. Advisory reports must present good arguments for the measures to be taken
6. Advisory reports must convince the reader that the right choices have been made
7. The writer must come across as an expert advisor
8. The sources of the arguments that are given must be clearly identified

The criteria regarding readability were:

9. Advisory reports must be formulated in an understandable way
10. Advisory reports must be clearly structured
11. Advisory reports must be formulated without any errors in spelling or grammar
12. The style of advisory reports must be compatible with that of the commissioner of the report

Advice quality scale
Next, raters were asked to rate the advisory papers on a five-point scale. Definitions of the scale points are shown in Table 7.1.

Table 7.1
Definitions of scale points for rating the advisory papers

Scale point	Meaning
1	The Gedeputeerde will throw the report into the waste bin
2	The Gedeputeerde will be able to distil only a few useful points from the report that can be used during the parliamentary debate
3	The Gedeputeerde will be able to use the majority of the advice in the during the parliamentary debate, despite several serious drawbacks
4	The Gedeputeerde will be able to use the majority of the advice during the parliamentary debate, despite a few details
5	The Gedeputeerde will unquestionably accept the advice and use it during the parliamentary debate

By defining the scale points in this way, the rater is encouraged to take into consideration how the reader (in this case the Gedeputeerde, the recipient of the advisory paper) would react to it. As such, the experts were asked to take a reader's perspective in their judgments. Based on their own experience with reading and writing advisory papers, the raters were assumed to be able to put themselves in the Gedeputeerde's position.

Three criteria with the most influence
After the raters had assessed one advisory paper using this scale, they were asked to indicate which three criteria were most important for the assessment of that particular advisory paper. The three most important criteria provide an indication of the rater's consistency across the advisory papers. The list of criteria was the same as the list that was used for assessing the importance of the general criteria. There may be differences between what raters consider important in general, and what they consider important in rating individual advisory papers. It may be expected that elements from an individual advisory paper draw attention to that general element, thereby increasing its importance for the final rating.

After raters had indicated the three most important criteria, they proceeded rating the next advisory paper.

Overall rating of all twelve advisory papers
When the raters had completed rating all 12 advisory papers, we asked them to provide an overall rating for all advisory papers as a whole. Knowing what raters consider important for advisory papers is not sufficient to enable us to interpret the results, since raters may adapt their ratings to the general level of the advisory papers. Raters were asked to provide a general score for all advisory papers taken as a whole, on a five-point scale.

Background questions
Finally, the raters were asked to answer a few background questions on their experience with reading and writing advisory papers, and on how they had experienced rating the twelve advisory papers. The difficulty that raters experienced while assessing the advisory papers is a measure – albeit an indirect one – of the intrarater consistency. In other words, the more difficulty raters experience, the less likely they are to evaluate the advisory papers in a consistent manner.

7.2.2 Agreement on Advice Quality

The 2 x 3 independent raters provided a holistic judgment that could have been influenced by their opinions both on what is important for that particular advisory paper and for advisory papers in general. As a result, they may also differ in how they perceive the quality of individual advisory papers. To account for these differences, we wanted to investigate the degree to which raters agree on advice quality for the twelve papers.

The second reason for checking the agreement between raters was that agreement between raters is a prerequisite for aggregating the ratings that were provided by individual raters.

Cronbach's α was chosen as measure of agreement between the six raters. It represents the internal consistency of a scale that consists of multiple items. In this case, each rater is seen as an item on an advice quality scale. The consistency of this advice quality scale can be seen as a measure of interrater reliability.
Although a level of .66 is relatively low, we average the six individual advice quality ratings and relate this average to measures of taking notes in order to draw clear-cut relationships. However, the relationships to be drawn should be interpreted with a degree of caution due to the limited sample size of 12 advisory papers and a modest Cronbach's α. Hence the analysis should be considered a first attempt at establishing the relationship between note-taking and text quality in a professional writing-from-sources task.

7.2.3 Average Advice Quality

In this section we will examine the results of the advice quality ratings as provided by the communication experts and domain experts. The average advice quality ratings are shown in Table 7.2.

Table 7.2
Average Advice Quality across Conditions

Advisory paper	Communication Experts	Domain experts	All experts
	Notepad Condition without Stock Issues		
# 7	3.7 (1.5)	4.0 (1.0)	3.8 (1.2)
#11	3.0 (1.0)	3.0 (1.0)	3.0 (.9)
#39	3.3 (1.2)	4.7 (.6)	4.0 (1.1)
	Notepad Condition with Stock Issues		
# 8	2.0 (.0)	3.0 (1.7)	2.5 (1.2)
#10	3.3 (1.2)	3.0 (1.0)	3.2 (1.0)
#27	3.3 (1.2)	2.0 (1.0)	2.7 (1.2)
	Marker Condition without Stock Issues		
# 4	3.7 (1.5)	2.7 (1.2)	3.2 (1.3)
#19	1.3 (.6)	1.7 (1.2)	1.5 (.8)
#24	2.7 (1.2)	2.0 (.0)	2.3 (.8)
	Marker Condition with Stock Issues		
# 1	3.3 (1.2)	2.3 (.6)	2.8 (1.0)
# 5	1.7 (.6)	2.0 (1.0)	1.8 (.8)
#38	2.3 (.6)	3.0 (1.7)	2.7 (1.2)
Total	*2.8 (.8)*	*2.8 (.9)*	*2.8 (.7)*

Note. Figures range from low (1) to high (5). Standard deviations between parentheses.

On average, the papers received a rating that was just below the 'neutral' point of 3. This is relatively surprising since the expertise and longstanding experience of the writers would lead us to believe that they are capable of writing such an advisory paper with a higher score than

almost 3 on a five point scale (in Table 7.1 defined as 'useful for the main part'). The short time-frame may provide the explanation that is responsible for this result. Furthermore, the writers were not familiar with the sources (on average writers were familiar with only 2.2 out of 5 publications), which could have influenced the quality of the papers negatively.

As can be derived from Table 7.2, no systematic difference could be observed between communication experts and domain experts. Using a Wilcoxon signed ranks test, we found no systematic differences between the two groups of experts (Z=-.134; n.s.). Thus, on average, communication experts do not assign different ratings than the domain experts.

7.2.4 Importance Ratings

In this section we examine the importance ratings for the advice quality ratings. By using a holistic rating scale, the raters were able to define for themselves what they considered important in advisory papers. To reconstruct what they considered important, we asked them to indicate how important certain criteria were for their judgments. We also wanted to know if communication experts paid attention to different things than domain experts, since this assumption was the basis for using two different groups of raters.

General importance ratings

For the general advice quality criteria, we computed the average for each criterion. The results are shown in Table 7.3, ordered by the importance that was attributed to each of the criteria. In the second column the type of criterion is indicated.

Table 7.3
Average Importance of General Advice Quality Criteria

Criterion	Type [a]	Communi-cation experts	Domain experts	*Total*	Rank
Comprehensibility	R	4.7 (.6)	5.0 (.0)	*4.8 (.4)*	1
Organization	R	4.3 (.6)	4.7 (.6)	*4.5 (.5)*	2
Completeness	U	4.0 (1.0)	5.0 (.0)	*4.5 (.8)*	3
Argumentation for potential actions	A	4.3 (.6)	4.3 (1.2)	*4.3 (.8)*	4
Reference to arguments' sources	A	4.3 (.6)	4.3 (1.2)	*4.3 (.8)*	5
Spelling, grammar	R	4.0 (1.0)	4.3 (.6)	*4.2 (.8)*	6
Presentation of advisor as expert	A	3.7 (.6)	3.7 (1.2)	*3.7 (.8)*	7
Argumentation for the 'right' choices	A	2.7 (1.2)	4.0 (1.0)	*3.3 (1.2)*	8

Table 7.3 (*Continued*)

Criterion	Type [a]	Communi-cation experts	Domain experts	*Total*	Rank
Consideration of political situation	U	3.3 (.6)	3.0 (1.0)	*3.2 (.8)*	9
Style in accordance with Gedeputeerde	R	3.0 (.0)	2.7 (.6)	*2.8 (.4)*	10
Applicability	U	2.3 (1.5)	3.3 (1.5)	*2.8 (1.5)*	11
Acceptability	A	3.3 (1.2)	2.0 (1.0)	*2.7 (1.2)*	12

[a] R = Readability; U = Usefulness; A = Argumentation

It becomes clear from Table 7.3 that comprehensibility, organization, and completeness are the most important criteria that the raters considered most important in general. We see then that readability and usefulness receive much of the raters' attention. Strikingly, applicability of the advisory paper is not considered very important, achieving an average score just below the neutral point (2.8).

Two groups of raters were employed in assessing the advisory papers. We wanted to know to what extent these groups differ from each other with regard to what is considered important. If communication experts differ in their opinions of what constitute important criteria for advice quality from domain experts, then we will need to draw relationships with both the average score of domain experts and that of communication experts. If there are no differences between domain experts and communication experts, then we can assume that both groups consider the same criteria equally important. Consequently, there would be no need to make a distinction between communication experts and domain experts.

Therefore, we tested for differences between communication experts and domain experts regarding the general advice quality criteria. We found no differences with regard to the twelve criteria ($1.50 < \text{Mann-Whitney U} < 4.00$; $-.24 < Z < -1.55$; n.s.).

Paper-specific importance ratings

Next, for each individual advisory paper, we examined the three advice quality criteria that the raters considered most important. Examining these criteria tells us the extent to which aspects of advisory papers that draw the attention influence the perceived importance of related criteria.

A criterion specified as being most important for judgment was assigned a score of three, the second-most important criterion was assigned a 2, and the third-most important a 1, while criteria that were not mentioned were assigned a score of 0. We summated the rankings for all advisory papers for all criteria. For each criterion then, the values can range from 0 to 36 (12 advisory papers x 3 points for the most important criterion). The results are shown in Table 7.4, ordered by their importance. The 'shift' column indicates the change of order in importance in relation to the general importance ratings (shown in Table 7.3).

Table 7.4
Importance of Advice Quality Criteria – Paper-Specific

Criterion	Type	Communi-cation	Domain	*Total*	Rank	Shift[a]
Argumentation for potential actions	A	22.3 (3.0)	12.3 (2.5)	*17.3 (6.0)*	1	+ 3
Completeness	U	12.0 (11.7)	20.7 (11.7)	*16.3 (10.5)*	2	+ 1
Organization	R	13.7 (9.1)	14.0 (3.6)	*13.4 (6.2)*	3	– 1
Comprehensibility	R	8.7 (5.7)	11.0 (7.5)	*9.8 (6.1)*	4	– 3
Argumentation for the 'right' choices	A	9.3 (.0)	1.3 (1.2)	*5.3 (7.3)*	5	+ 3
Applicability	U	6.0 (1.7)	4.0 (1.7)	*5.0 (4.6)*	6	+ 5
Reference to arguments' sources	A	1.3 (2.3)	1.0 (1.7)	*1.2 (1.8)*	7	– 1
Presentation of advisor as expert	A		2.3 (2.5)	*1.2 (2.0)*	8	– 1
Spelling, grammar	R	.3 (.6)	1.7 (2.9)	*1.0 (2.0)*	9	– 3
Acceptability	A	.3 (.6)	1.0 (1.7)	*.7 (1.2)*	10	+ 1
Style in accordance with Gedeputeerde	R		.7 (1.2)	*.3 (.8)*	11	– 1
Consideration of political situation	U				12	– 3

For several criteria substantial differences were found between the general importance ratings and paper-specific importance ratings. In general, argumentation and applicability are considered more important in the paper-specific ratings, while readability (organization, spelling and grammar) is considered less important than in the general importance ratings. No such a pattern is visible for usefulness. Raters shift their attention from textual criteria to criteria regarding the content and rhetoric of the paper.

The argumentation for potential actions is considered even more important in evaluating the individual advisory papers than the general importance ratings have shown. It seems that from the perspective of the raters, providing well-founded suggestions for potential actions is the purpose of this type of advisory paper, therefore making it the most important criterion.

Applicability is considered far more important (+5) in evaluating individual advisory papers compared to evaluating the general importance of applicability for advisory papers in general.

The political situation was not considered one of the three most important criteria by any of the six raters when they evaluated individual advisory papers. Consequently, the political situation fell three places in the ordering of criteria importance. Raters may have been aware of the importance of this criterion for advisory papers in general, but did not pay attention to it when they were rating individual advisory papers.

To further explore the extent to which the general and paper-specific importance ratings overlap, we computed the correlations between them. The correlation between both measures of criteria importance is an indication of the extent to which raters consider the same aspects important in general, and for specific advisory papers. The correlation between the general importance and the advisory paper-specific importance was not significant for any of the twelve criteria. As a conclusion, we argue that the individual advisory papers themselves strongly influence which aspects are considered important. This conclusion is discussed in more detail in the next section, Section 7.2.5.

7.2.5 Relationship between Advice Quality and Criteria Importance

So far we have analyzed the importance of the criteria as a characteristic of the individual raters. But it is reasonable to assume that the criteria are not only the result of characteristics of the rater, but also of the advisory papers themselves. It could be that the score for an advisory paper is influenced by what raters consider important. To test the relationship between the advisory papers and the importance that was attributed to the advice quality criteria, for each advisory paper, we analyzed which criteria the raters reported as having the most influence on their advice quality ratings.

To test the relationship between what readers consider important and the quality of the advisory paper, we computed correlations between the sum of ranks for each item for each individual advisory paper. We found that for six raters the score for each item ranged from 0 to 6 x 3 points (6 raters x 3 points for the most important criterion). Significant correlations were found between average advice quality and the rank sum for some of the criteria.

The importance attributed to applicability proved to be positively related to advice quality ($\varrho(12)=.75$; $p<.01$). It may be that when raters read unusually concrete, directly applicable advice, it reminded them of the importance of applicability. Ultimately, this may have resulted in both a higher advice quality rating and a higher importance being attributed to applicability.

For spelling and grammar the relationship is reversed. The more importance the raters attributed to spelling and grammar, the lower the quality of the advisory paper ($\varrho(12)=-.62$; $p<.05$). This result is not surprising. When writers make many spelling and/or grammatical errors, attention is drawn to these errors. This makes spelling and grammar increasingly important in rating the advisory papers, while the errors will have a negative impact on advice quality.

Comprehensibility is also negatively related to average advice quality. The more important comprehensibility was in the judgments of the raters, the lower the quality of the advisory papers ($\varrho(12)=.67$; $p<.05$). The explanation of these results could be the same as for the spelling and grammatical errors. When raters have problems understanding what the writer means, comprehension becomes more important in judging the advisory paper, while an advisory paper that the rater cannot understand will receive lower ratings. This explains the negative relationship between importance of comprehensibility and average advice quality ratings.

In conclusion, if raters' attention is drawn to certain aspects of the advisory papers, both the importance that is attributed to these aspects and the quality of the papers is also positively or negatively affected.

7.3 Relationship between Note-Taking Tool and Advice Quality

In this section we will explore the relationship between the tool environment and advice quality (see Figure 7.1). More specifically, we will examine the differences in advice quality ratings between the notepad condition and the marker condition, as well as the differences between the conditions with and without stock issues provided. Differences in advice quality ratings between conditions are tested by means of a Mann-Whitney U test. We test for differences between the notepad and the marker condition as well as for differences between the conditions with and without stock issues provided. Unfortunately, we cannot test for Tool x Stock issues interaction effects since the sample size (n= 4 x 3) is too small to use analyses of variance. However, since the chapters on the process and product of taking notes yielded so few interaction effects on measures of note-taking, it is not very likely that such interaction effects will be found in the advice quality ratings.

To test whether using the notepad tool or the marker tool affects the quality of the advisory papers, we computed the average quality ratings for the notepad condition and the marker condition as well as for the conditions with and without stock issues provided. Table 7.5 shows the results for both tool conditions.

Table 7.5
Average Advice Quality in the Notepad and the Marker Condition (N=2 x 6)

	Notepad	Marker	*Total*
Mean	3.2 (.6)	2.3 (.6)	*2.8 (.7)*

Note. Standard deviations between parentheses.

At first glance, there seems to be a difference between the notepad condition and the marker condition, with advisory papers in the notepad condition receiving higher ratings than the marker condition. However, this difference approached – but did not reach – significance (Mann-Whitney U=7.00; Z=-.1.77; p=.08). The lack of significant results may be due to limited power since the sample size of the advisory papers (n=2 x 6) was relatively small.

A closer examination of the results shows that the lack of significant differences is due to the communication experts. For the domain raters, the difference between the marker condition and the notepad condition was significant (Mann-Whitney U=5.5; Z=-2.05; p<.05). For the communication raters, the difference between the notepad condition and the marker condition was not significant (Mann-Whitney U= 11.00; Z=-1.14; n.s.). However, this result should be interpreted with caution since there were only three domain raters.

Nevertheless, there is a *tendency* for papers in the notepad condition to receive higher ratings than papers in the marker condition. This seems to be in contrast with Slotte & Lonka (1999), who found that more note-taking resulted in superior comprehension. Since the marker tool was on average used far more often than the notepad tool, we would have expected the

advisory papers in the marker condition to receive higher ratings than the advisory papers in the notepad condition. After all, more notes could possibly result in superior advisory papers, because writers allegedly engage in deeper processing.

This expectation could not be supported by our data. The additional task of taking notes with a new application could have distracted writers from the task of writing an advisory paper. As we have argued in Chapter 5, incorporating new technology into a challenging task such as writing-from-sources could have been difficult for writers in the marker condition, which may have resulted in a lower quality of the advisory paper. However, the data do not provide us with sufficient evidence to be certain about this explanation.

Next, we examined the effect of providing stock issues to the writers on advice quality. Since in the previous chapters few effects were found regarding the process and product of taking notes, no effect on advice quality was expected. We computed the average advice quality ratings for the conditions with and without stock issues provided. The results are shown in Table 7.6.

As can be seen from Table 7.6, the difference between the conditions with and without stock issues is small. Corresponding with our expectations, this difference proved decisively not to be significant (Mann-Whitney U=12.50, Z=-.88; n.s.) .

Table 7.6
Average Advice Quality in the Conditions With and Without Stock Issues Provided (N= 2 x 6)

	Without stock issues	With stock issues	*Total*
Mean	3.0 (.9)	2.6 (.4)	*2.8 (.7)*

Note. Standard deviations between parentheses.

In conclusion, for the twelve advisory papers that were rated, no relationship could be found between the note-taking tool provided and advice quality, even though there is a tendency towards advisory papers in the notepad condition receiving higher ratings than advisory papers in the marker condition.

7.4 Relationship between Process of Taking Notes and Advice Quality

In this section we depict the relationship between the process of taking notes and the quality of the advisory papers.

7.4.1 Advice Quality Related to Note Taking Activities

In previous research it was found that the more writers take notes, the better their performance (Slotte & Lonka, 1999). Based on these findings, it could be hypothesized that writers write better advisory papers when they take notes more often. To test this assumption, we computed the correlations between the number of note-taking activities and advice quality. In computing these correlations, we make a distinction between the notepad condition and the

marker condition, since a potential effect on advice quality could depend on the tool writers use to take notes.

Neither in the notepad condition nor in the marker condition was a correlation found between the *total* frequency with which writers take notes and advice quality. Thus, in contrast to what Slotte & Lonka (1999) found, in general more note-taking did not result in superior performance, regardless of the tool participants were able to could use to take notes.

Next, we explored the relationship between advice quality and the frequency of *particular types* of notes. It is possible that the total number of notes is not related to advice quality, but that some particular activities are in fact related to advice quality. Correlations were computed between the frequency of all types of notes and advice quality. In the notepad condition, no relationship was found between advice quality and the frequency with which:

- Self-written notes were taken
- Citations were copied to the notes
- Citations were copied to the advisory paper

In the marker condition, no relationship was found between advice quality and the frequency with which:

- Highlights were taken
- Sticky notes were taken

For the marker condition, the frequency with which citations were copied to the advisory paper was strong and highly significant ($\varrho(12)=.94$; $p<.01$). This is in contrast to both Slotte & Lonka (1999) and to the pilot study. Both studies provide evidence for a *negative* relationship between verbatim note-taking and performance. Thus, verbatim copying of passages results in lower performance. In the current study, the relationship proved to be reversed: in the marker condition more verbatim copying resulted in better advisory papers.

The topic knowledge and experience with the task may be responsible for this reversed relationship. In this study, writers are more experienced with performing the task. They also have more topic knowledge than participants in the pilot study and in the study conducted by Slotte & Lonka (1999). As a result, writers are able to be more selective regarding which citations to copy. When citations are well-chosen in the light of the task – which is what happened, see Chapter 5 – they can have a positive effect on advice quality.

In conclusion, surprisingly copying citations proved to affect the quality of the advisory papers positively in the marker condition. No relationship was found between the other note-taking activities and the quality of the advisory papers. Thus, apart from copying citations in the marker condition taking notes frequently does not necessarily result in better advisory papers.

7.4.2 Relationship between Cognitive Activities and Advice Quality

The notes writers took were the result of the cognitive activities they performed while reading and writing. In educational research, cognitive explanations are offered for the effect of taking notes on performance. The encoding effect (Di Vesta & Gray, 1972) suggests that deeper processing results in better retention and relational inference through the mere act of note-taking in itself. Therefore, we analyzed the relationship between cognitive activities related to taking notes and the quality of the advisory papers.

We also included 'Evaluating content of reading' in our analysis since we found an approach of reading, pre-selecting and deferred modification of information in Chapter 5. The pre-selection of information was the result of an evaluation of the information. This cognitive activity, closely related to taking notes, may have a direct influence on the quality of the advisory paper. No relationship could be found between the cognitive activities that were related to taking notes and advice quality. Further examination of the data revealed that evaluation of the notes was strongly related to advice quality for the domain experts ($\varrho(12)=.93$; $p<.01$), but not for the communication experts. It is possible that the correlation did not approach significance due to a higher variability within the group of communication experts. For the group of communication experts, Cronbach's α proved to be .45, whereas for the group of domain experts, this reached an α level of .55. This may have caused the absence of a correlation between communication experts' quality ratings and the frequency of evaluations of notes.

Summing up then, there are some indications for a relationship between how often participants evaluate their notes and the quality of their advisory paper. Additional support for this indication can be found in educational research. This relationship, known as the external storage/review effect, has been demonstrated in several studies (Di Vesta & Gray, 1972; Kiewra et al., 1995).

7.4.3 Conclusion

In conclusion, the process of taking notes proved to be only marginally related to advice quality. However, the negative relationship between the number of notes that writers took and advice quality is striking considering the positive relationship that was to be expected based on the literature. Additionally, indications were found for a positive effect from reviewing notes and copying passages to the advisory paper. Since the number of respondents was quite low, and since it was unfeasible to assess all advisory papers, these conclusions should be interpreted with a certain degree of caution.

7.5 Relationship between Product of Taking Notes and Advice Quality

In this section we shift our attention from the process of taking notes to the product of taking notes. We analyze the relationship between the product of taking notes and advice quality. More specifically, we address the relationship between the quality of the advisory papers and:

- the organisation of the notes
- the use of the sources and the notes

7.5.1 Relationship between Organization of the Notes and Advice Quality

In Section 6.2.2 it was found that writers created relatively few headings in their notes. What effect does not structuring the notes have on advice quality? From previous educational research, we know that organizing notes according to an outline or a hierarchical framework enhances student performance (Kiewra et al., 1995). Not organizing the notes may affect advice quality negatively.

We computed the correlations between the number of headings in the notes and advice quality. In interpreting the results, it should be emphasized that relatively few cases were available since so few headings were created. Consequently, we were not able to compute all correlations.

Similar to our approach in Section 6.2.2 we distinguish between *content headings* (whose purpose is to collect and organize relevant information from the sources) and *functional headings* (for planning purposes). We also distinguish between both tools for taking notes, since the tool environment affects the manner in which headings can be created.

For the notepad condition, we found a significant correlation between the number of *content* headings and average advice quality ($\varrho(6)=.85$; $p<.05$). The results from the notepad condition mirror Kiewra et al. (1995), who investigated note-taking during lectures. They found that a flexible outline that follows the lecture's structure resulted in superior recall. Apparently, organizing notes that were taken with Notepad by means of headings that reflect the content of the source is also beneficial in the context of professional writing-from-sources. In contrast, structuring notes that were taken with iMarkup did not result in a comparable effect.

In the notepad condition, the correlation between advice quality and the number of *functional* headings was not significant. For the marker condition, neither the number of content headings nor the number of functional headings achieved significance. In these cases, the creation of a scheme by means of which the sources are read and taken notes on did not contribute to the quality of the advisory papers.

Until now we have focused on the headings themselves. We have not examined the number of notes that were shared below these headings. Consistent with the approach followed in Section 6.2.2, in the notepad condition we counted the number of clauses below the headings in the notes, while in the marker condition we counted the number of highlights and sticky notes that were shared under one category. Interpreting information from the sources in terms of writers' own schema (or in terms of the stock issues provided) could be beneficial for writers, because they then engage in additional processing: the encoding function of note-taking, as suggested by Di Vesta & Gray (1972).

For the notepad condition, we subsequently computed correlations between advice quality and the number of clauses that were shared below content headings and functional headings. The correlation proved not to be significant. For the marker condition, we computed the correlation between advice quality and the number of notes that were shared below content categories and functional categories. Again, no significant correlation was found.

In conclusion, creating content headings is beneficial for writers only in the notepad condition. For the other cases, creating headings or sharing notes under headings did not affect advice quality, independent of tool and type of heading.The product of note-taking is therefore linked to advice quality only to a small extent.

7.5.2 Relationship between Use of Sources and Notes and Advice Quality

In this section we examine the flow from sources to notes, and finally to the advisory paper with regard to its relationship with advice quality. Comparable to our analyses in Chapter 6, we address the relationship between advice quality and the manner in which the sources and notes are used from two perspectives: from the perspective of the notes, or from the perspective of the advisory paper.

Use of notes for the advisory paper
Is there a relationship between advice quality and the manner in which writers use the notes? The notes may be copied to the advisory paper or paraphrased in the advisory paper, or they may be left unused.

We computed Spearman correlations between the possible uses of the notes and the quality of the advisory papers. No significant correlations between the use of the notes and average advice quality across all six raters were found either for the notepad condition (n=6) or for the marker condition (n=6).

Further inspection of the data however, reveals that in the notepad condition for the communication experts, the total number of clauses is negatively related to advice quality ($\varrho(6)=-.83$; $p<.05$), while copying passages directly to the advisory paper is also negatively related to advice quality ($\varrho(6)=-.81$; $p=.05$). Although this result should be interpreted with caution due to the small sample size for partial correlations, there are at least indications that lengthier advisory papers are valued less by the communication experts.

In the marker condition, for the domain experts a correlation was found between the percentage of highlights that was used verbatim in the advisory paper and the average quality of the advisory paper ($\varrho(6)=.96$; $p<.01$). Domain experts may have considered well-chosen citations from the documents a worthwhile addition to the advisory papers, whereas communication experts may have been less certain about the role of these citations in the advisory paper – since the citations are not adapted to the current rhetorical situation, but are written for other purposes.

Origin of sentences in the advisory paper
What is the origin of the clauses in the advisory paper, and is this origin related to advice quality? As mentioned in Section 6.1.4, clauses may be derived from:

- the sources
- the notes
- writers' prior knowledge

We computed the Spearman correlations between the percentage of the sentences that was derived from each of these origins. No significant correlations were found. Thus, the quality of the advisory papers is not related to the origin the writers use to derive their information from. It may be that the rhetorical skills, the composition skills, and the prior knowledge of the writers account for a large share of the variation between the advisory papers of the writers. This seems likely since on average approximately 50% of the sentences in the advisory paper are derived from prior knowledge.

7.5.3 Conclusion

From the previous section, it is clear that we could find little support for a relationship between advice quality and the manner in which information from the sources and the notes is used for the advisory papers. We found a positive relationship only between the number of content headings and how writers structure their advisory papers in the notepad condition. This result may be interpreted as an indication that organizing information that is collected from extensive sources could be helpful for writers who are engaged in a writing-from-sources task. But organizing information seems to be effective only when writers organize information themselves, since writers who were provided with the task's stock issues did not write better advisory papers than writers in the other conditions.

With regard to the use of the notes, we only found some indications. Communication experts assigned lower ratings to the advisory papers when more passages were copied (notepad condition), while in the marker condition they gave advisory papers higher ratings when more highlights were used. This is surprising since in both cases writers use information from the sources verbatim. However, for the highlights, writers had to revisit the highlights and re-evaluate whether they wanted to incorporate the passage into the advisory paper. This additional cognitive effort may have contributed to a better advisory paper.

7.6 Relationship between Cognitive Load and Advice Quality

In this section we will analyze the relationship between the cognitive load of note-taking with the tools we provided and the quality of the advisory papers.

We computed correlations between the cognitive load that the note-taking tools impose – as reported every 10 minutes by the writers themselves– and average advice quality across the twelve advisory papers whose quality was rated. We made a distinction between the notepad condition and the marker condition, because the different tools may have a different influence on the quality of the advisory papers. The results proved not to be significant. No systematic influence of cognitive load on advice quality could be found.

It is possible that the cognitive load of the task blurred the relationship between advice quality and cognitive load of the tool. Thus, because writers were knowledgeable about the task and the domain, they compensated for the additional difficulty of using the tool or, alternatively, they added to the benefits they gained from using the tools. Consequently, the relationship between the cognitive load of the tool and the quality of the advisory papers is in both cases concealed.

However, this assumption could not be supported by the data. We computed partial correlations between the cognitive load of the tool and advice quality while controlling for the cognitive load of the task. This correlation proved not to be significant.

Next, we tested whether the correlation worked the other way around: it is possible that the cognitive load of the tool changed the relationship between the cognitive load of the task and advice quality. Lower levels of tool load suggest that the task becomes easier for the writers, while higher levels make the task more difficult. However, again the partial correlation between cognitive load of the task and advice quality while controlling for the cognitive load of the tool was not significant.

In conclusion, no relationship could be found between the cognitive load of the tool, the cognitive load of the task, and advice quality. It could be that the prior knowledge and experience of the writers reduced the influence of the cognitive load on advice quality. Thus, even if the levels of cognitive load were relatively high, their prior knowledge and experience enabled them to compose an adequate advisory paper.

7.7 Conclusions

We can conclude from this chapter that by using our method for measuring advice quality, we were able to observe a limited effect of variations in the process and product of writing-from-source on the quality of the advisory papers.

Only a few relationships were found between the process and product of taking notes and the quality of the advisory papers. For the relationship between the process of taking notes and advice quality, we found a positive correlation with the frequency with which citations were

copied to the advisory paper in the marker condition. For the relationship between the product of taking notes, we found a positive correlation between the number of content headings and the quality of the advisory paper in the notepad condition.

Also a tendency was found for advisory papers in the notepad condition receiving higher ratings than in the marker condition. However, the data do not provide a conclusive explanation for this tendency.

The notes apparently influenced the quality of the advisory papers only to a limited extent. There may be a gap between what writers intend to do, and what writers ultimately accomplished. In other words, the notes may have been the result of a strategy whose outcomes are not fully reflected in the advisory papers. Notes will then have a substantial impact on the process of writing-from-sources, but not on its outcome, the resulting advisory paper.

Although no relationship was found between note-taking approaches and advice quality, substantial effects were found in the previous chapters regarding the functions of the tools and the various ways in which writers use the sources for their advisory papers (the product). In terms of our framework of the writing-from-sources process, our data provide marginal evidence for a relationship between advice quality on the one hand, and tool environment and note-taking (process and product) on the other hand. It can be concluded then from this chapter that with our method for measuring advice quality we could observe only a limited effect of these process and product differences on the quality of the advisory papers.

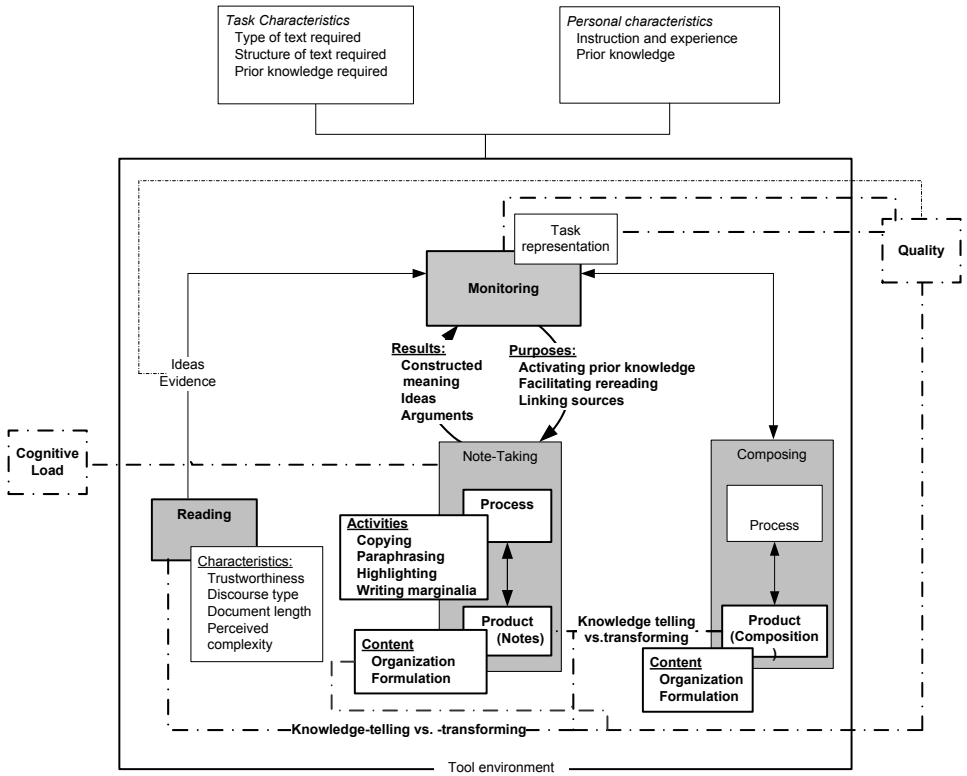
Conclusions

Chapter 8

We have conducted and described an exploratory study of the writing-from-sources process on screen within a professional setting. We are able to draw a number of conclusions about the writing-from-sources process, and the role of notes in this process. Apart from drawing these conclusions, in this chapter we will also identify opportunities for future research as the next steps towards a predictive model of the writing-from-sources process.

In Chapter 1 we have introduced a framework of writing-from-sources that pointed out the variables that influence the writing-from-sources process most. The framework is once again shown in Figure 8.1.

Figure 8.1 Framework of the Writing-from-Sources Process



The framework is based on studies in which *student* participants carried out a writing-from-sources task within a *paper* environment. The results from our study show that it is a valuable descriptive framework for gaining insight into *professional* composition processes within an *on screen* environment, although no substantial evidence could be found for the assumed relationship between note-taking and quality.

In comparison to earlier research on writing-from-sources the analyses described in the previous chapters have elaborated our understanding of the monitoring and the note-taking components. In other words, we have gained a more detailed insight into the influence of the task throughout the process, and how task purposes steer the note-taking activities. In addition, by analysing how writers modify information from the sources and the notes to substantiate the advisory papers, we have observed how these process characteristics relate to the composition component of the model.

By carrying out these analyses we have provided a descriptive foundation for a model on the writing-from-sources process within a professional setting. As a prerequisite for such a model of the writing-from-sources process, we need hypothesis-testing experimental research on the model components with respect to the effect of different levels of prior knowledge, different tasks, or different note-taking tools. The present study can provide the starting point for such research.

A number of conclusions can be drawn in relation to the components of the framework we have investigated. We present our conclusions by means of statements that each refer to an element of the framework of the writing-from-sources process.

Conclusion 1 (Monitoring)
The writing-from-sources process of professionals is highly purpose-driven

We have seen that writers approach their task in a highly purpose-driven manner. Manifestations of writers' purpose-driven approach were found in:

- The *arguments* for using specific information for the advisory paper
  The sources were often evaluated in terms of their usefulness and relevance for the advisory paper (see section 4.2.1 and 4.2.2)
- The *types of modifications* writers engage in
  In Chapter 6 we have analysed the specific modifications that writers apply to the text from the sources. The two cases we have analysed in detail suggest that writers modify information in accordance with the rhetorical purposes they seek to accomplish. In other words, the rhetorical problem prevailed over the content problem.
- The *attention* writers pay *to the task description*
  It was found that writers paid considerable attention to the task description (See Section 4.2.1, 4.3.1, and Section 5.5.1). The majority of the notes were taken while reading the task description, which is considered an indication of how important the task was for the writers.

Even though some writers took a similar approach to that in the pilot study – a pre-selection of information that is to be evaluated in terms of usefulness later on in the process – it did not result in unfocused reading. Writers took conscious task-related decisions on what to select and include in the advisory paper.

We expected that when the task's stock issues were provided to the participants by means of the note-taking tool, it would help writers take a more purpose-driven approach. However, few differences were found in task approach between participants in the conditions with stock issues and those without stock issues. Writers' purpose-driven behaviour is a possible explanation for the limited effect of the stock issues: since they were already engaged in a purpose-driven process, they did not need the stock issues to remind them of the important issues of the task.

The conclusion that the writing-from-sources process is strongly purpose-driven extends the applicability of the results from earlier research on professional *reading* to writing-from sources. In studies on professional reading (e.g. Bazerman, 1985; Van Duyne, 1983; Neutelings, 2001), it was shown that professionals read very selectively based on their reading tasks and their prior knowledge. However, the tasks that were provided in professional reading research were restricted to a very unspecific *reading* task. In this study we have provided the professionals with a specific *writing-from-sources* task that included reading, note-taking, and composing. The purpose-driven approach of professionals was found to apply not only to reading tasks, but also to writing-from-sources tasks carried out by professionals.

Although in the current study we have seen many manifestations of the task's influence on the process, for future research it is recommended to systematically vary the tasks in terms of their level of specificity and rhetorical complexity.

Conclusion 2 (Note-taking purposes and activities)

In professional writing-from-sources tasks, note-taking not only serves as an aid to the comprehension of the source material, but also as a facilitator of the interpretation of the rhetorical and the content problem.

In the present study writers proved to take notes primarily at the start of the process independent of the tool being used (see Section 5.4.1). Writers in a digital environment proved to spend considerable time on reading and taking notes of the task description. By taking notes they increased their task comprehension, selected the issues to address, and planned their process. Note-taking facilitated task comprehension, but did not contribute to participants' understanding of the source materials.

The results from this study seem to point to an extension of the beneficial effects of taking notes known as the encoding function (as identified in early educational research, Di Vesta & Gray, 1972). The encoding function of note-taking refers to the beneficial effect of taking notes as the result of the additional processing that is involved in the note-taking process both in the marker condition and in the notepad condition. Even stronger, in the notepad condition the encoding function of note-taking is far more important than the external storage function (i.e. the benefit of storing and reviewing information in notes to reduce the required cognitive effort).

In the case of a professional writing-from-sources task, we interpret additional processing not only as additional comprehension efforts, but also as efforts spent on assessing the rhetorical problem and the content problem (as defined in Bereiter & Scardamalia's (1987) models of the composition process).

Since facilitating task comprehension was such an important function of note-taking in both tool conditions in future research the functions of note-taking should be investigated using a tool that is designed specifically to facilitate task comprehension. More specifically, we need additional insight into which functionality of note-taking tools can most effectively contribute to a user's understanding of the rhetorical problem.

Conclusion 3 (Note-taking activities and purposes)

The extent to which cognitive effort is distributed between the individual and the notes depends on the note-taking tool writers were able to use to take notes.

To carry out the writing-from-sources task, writers were provided with either a marker tool or a notepad tool. Differences between the tools seemed to affect the extent to which they used the notes to offload cognitive effort. Writers in the marker condition engaged in a process of tentatively selecting and highlighting information prior to taking the decision of whether to incorporate text into the advisory paper or not (see Section 5.5.2). Writers in the notepad condition did not engage in such a process, presumably because they considered this additional step redundant more often than participants in the marker condition. These differences in approaches however left the reported cognitive load of the tool and the task unaffected.

Taking a Distributed Cognition perspective on the writing-from-sources process, O'Hara et al. (2002) argue that by temporarily storing information in notes writers can reduce the cognitive effort they need to spend on the task. When writers take notes, they no longer need to keep that information in their minds.

The results from our study show that with a tool such as iMarkup writers are able to offload cognitive effort to the notes. Writers were observed to highlight passages frequently. Some writers selected information from the highlights to incorporate it into the advisory paper at a later stage. This process of note-taking for later use in the process removes the necessity to keep chunks of information in mind throughout the process. The results from this study show that in a digital environment a writer could gain benefit from using a tool such as iMarkup, because it enabled distributing cognition between the individual and the notes.

However, writers in the marker condition were sometimes hindered when they sought to off-load cognitive effort to the notes. They expressed the need for a blank window (such as Notepad) to reorganize the information they have collected from the sources. Reorganizing information without support of a tool imposes a cognitive load on the writer. Therefore, some participants used sticky notes to accomplish this task. Apparently, the marker tool's overview was not considered suitable for that task.

Future research is required to investigate the extent to which writers who are engaged in a writing-from-sources task can benefit from temporarily storing information in the notes. The findings suggest that distributing cognition should be facilitated both by a tool that enables in-text markings, while at the same time 'space' is needed to reorganize the information that is collected from the sources.

Experimental research that compares note-taking tools that differ with respect to the memory support they give will improve our understanding of the relationship between note-taking and cognitive load.

Conclusion 4 (Relationship between Note-taking and Quality)

Taking notes affects the process and the product, but affects the quality of the advisory papers to a lesser extent

We were able to observe a significant correlation between the quality of the advisory papers and copying and pasting citations in the marker condition. For other note-taking activities or cognitive activities little evidence could be found for a relationship between these activities and the quality of the advisory papers. It seems that differences in note-taking approaches do affect

process and product, but have a limited influence on the perceived quality of the advisory papers, as rated by both content experts and communication experts.

Also a *tendency* was found for papers in the notepad condition receiving higher ratings than papers in the marker condition. The current study does not provide sufficient evidence for a conclusive explanation for this tendency.

Since student texts differ on many points from professional texts, which have a much clearer rhetorical problem and purpose, a new instrument was necessary to assess the quality of the advisory papers. The instrument we have developed to measure the quality of the advisory papers written by professionals differs from instruments designed to measure text quality in earlier educational studies on writing-from-sources. As shown in Section 1.6.6, the most common method to measure text quality proved to be scoring the papers on a number of text variables. In contrast, in this study we took the paper's persuasive strength as perceived by the expert reader as the starting point. However, it appeared that developing such an instrument to measure text quality is a complex task due to the divergent opinions experts hold concerning what text quality actually is.

Additional research efforts are required for developing an instrument to assess the quality of professional texts. Improvements in the methodology in terms of procedures and scale-point definitions are necessary to produce an instrument that can convincingly provide evidence for a relationship between note-taking and text quality. Such an instrument would be a substantial advancement in research on writing and technical communication. The instrument we have used in this study should be considered as the product of a first attempt at developing such an instrument.

Conclusion 5 (Note-taking; Personal characteristics)
Writers take notes most often when they have only moderate levels of prior knowledge

In this study we did not measure or manipulate prior knowledge directly. The influence of prior knowledge was observable indirectly from the think-aloud protocols and our analysis of writer's activities when they are *not* taking notes. When writers demonstrate their prior knowledge on only a few occasions – that is, when writers verbalise thoughts that draw on their prior knowledge –, they seem to refrain from taking notes. On the other hand, writers who relied on their prior knowledge also took notes on only a few occasions. For this latter group of writers, a large part of their advisory papers was based on their prior knowledge, leaving the sources unused. This significantly reduces the chance of notes being taken.

In research on note-taking, little attention has been paid thus far to the relationship between prior knowledge and note-taking, even though it can be hypothesized from a Distributed Cognition perspective that more prior knowledge leads to lower cognitive demands and hence to less of a need to offload cognitive effort to notes.

Our results are a first step in understanding how prior knowledge is related to note-taking. In future research the role of prior knowledge should be further investigated by comparing participants with different levels of prior knowledge in terms of their note-taking behaviour.

Conclusion 6 (Relationship between Sources, Note-Taking and Composition)

Writers engage in rhetorical reasoning to modify information from the sources via the notes to the final advisory paper

Our analyses of the think-aloud protocols (as presented in Section 4.3 and Chapter 5) and the modifications that were made from sources via notes to advisory paper (Chapter 6), indicate that writers do engage in rhetorical reasoning in this particular writing-from-sources task.

Writers proved to engage in rhetorical reasoning in modifying the information from sources via the notes to the advisory paper. The detailed analysis of two cases has led to an inventory of possible modifications of information to the rhetorical goals of the writer. In addition, it was found that across all participants a relatively low number of clauses is incorporated into the advisory paper verbatim without modification (see table 6.19). In contrast to what can be expected from Lewkowicz (1994), writers were observed to adapt the information they found in the sources to the rhetorical situation at hand.

Lewkowicz (1994) found that students reproduce information from the source texts by using the original formulations without placing the used phrases in the context of the text to be written. This is characteristic for the knowledge-telling model of the composition process as proposed by Bereiter & Scardamalia (1987).

However, Bereiter and Scardamalia argue that for *experienced* writers solving the content problem is only *part of* the strategy for solving the rhetorical problem. The present study has shown that *professional* writers who are confronted with a real-life task demonstrate similar behaviour: although they make use of information from the sources, they modify the information to adapt it to the rhetorical situation at hand. It is proven that Bereiter & Scardamalia's notion of the primacy of the rhetorical problem is not only applicable to student writing, but also to writing-from-sources by professionals.

The in-depth analysis of the cases and the notes and advisory papers that were produced helps us understand the rhetorical reasoning writers engage in. However, the limited scale of this analysis makes the formulation of hypotheses to be tested in experimental research rather difficult. Therefore, in order to improve our understanding of the rhetorical reasoning processes that professionals engage in, we need a more large-scale detailed analysis of the specific modifications that writers make to information from the sources and the notes.

Towards a Predictive Model of the Professional Writing-from-Sources Process

This thesis started with the report of Martin, an engineer who was highly experienced with writing-from-sources. Observing thirty-eight other professionals (government officials) helped us to construct a broad descriptive framework that covers a number of process variables that proved to have a large impact on the writing-from-sources process.

This framework of the writing-from-sources process can provide a useful starting point for developing a predictive model of the writing-from-sources process. We hope that this model, in time, will provide a basis for helping professionals like engineers and government officials, to do their writing-from-sources work more effectively and efficiently, either in a paper or in a digital environment.

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Summary

Professionals in organizations often make use of source material in order to write an evaluation, a report or a recommendation. This task, also known as writing-from-sources, is increasingly being performed, either totally or partially, in a digital environment. Reasons for this could be that the source material is too extensive, or unable to be effectively searched if it were to be printed.

In this dissertation we study the writing-from-sources task based on the behaviour of professionals who have been asked to write a text, in an on-screen environment, based on a website containing information while being allowed to make notes using a note-taking tool.

Chapter 1
Little research has been done into writing-from-sources performed by professionals. Existing research into how professionals read categorizes the professional reading process as active, purpose-driven, selective, and steered by prior knowledge.

Existing research into writing-from-sources employing schoolchildren and students is characterized by a great variety of methodologies and dependent variables. This makes it difficult to compare results. The research has predominantly been performed within an educational context, so that the findings can not be generalized to professional situations. However, the results from previous research into writing-from-sources do help to identify the process variables that appear to have the most influence:

- The task
- The sources
- The role of prior knowledge and experience
- The relation between the reading process and the writing process
- The role of notes

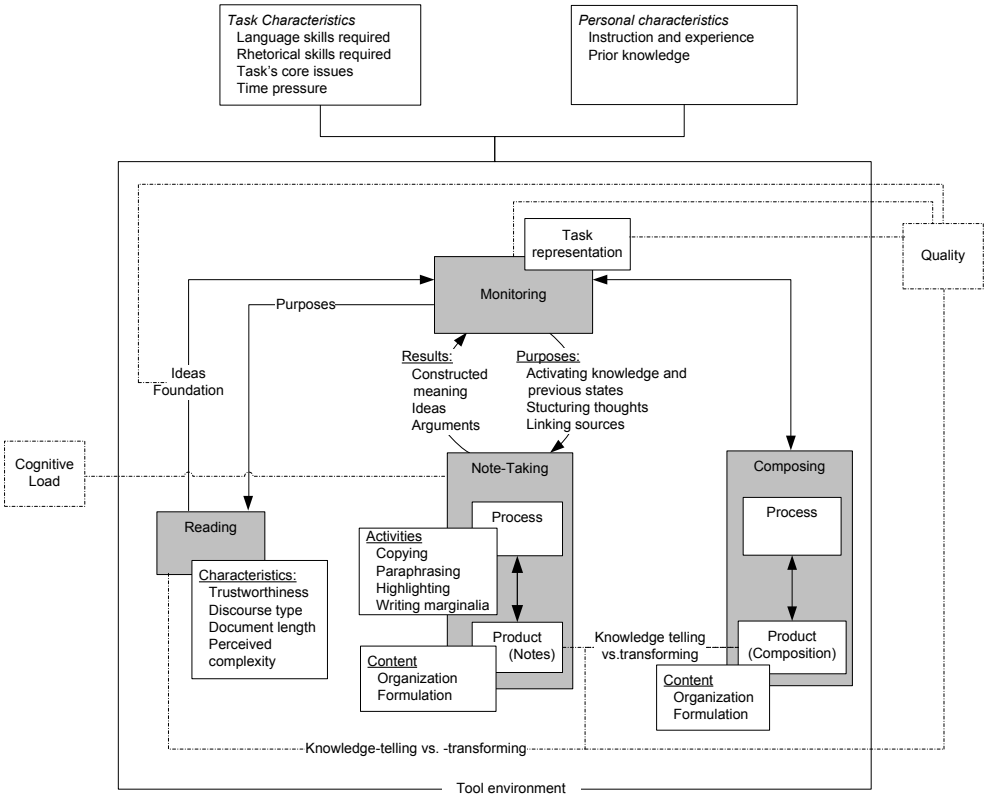
The results from earlier writing-from-sources research suggest that in the case of more advanced writing students, the task in question plays a dominant role in the whole process, dependent on the expertise of the writers. Inexperienced writers allow themselves to be led more by the sources and less by the task at hand, which results in a text that consists of a collection of ideas (*knowledge-telling*). Experienced writers with much prior knowledge allow themselves to be led primarily by the task that they are performing. They analyse their task and, based on this, they consult the sources with the aim of collating arguments for the final task (*knowledge-transforming*).

Existing research has established that reading and writing are strongly inter-related. There is no strict division between reading and writing, even though reading dominates at the start of the process, while later on in the process, writing plays the more dominant role.

Little research has been done into note-taking in an electronic environment. The research that is available paints a picture of new possibilities, but also of the complexity of working with note-taking tools and a clear preference on the part of readers for notes on paper. Extremely little is known about the role of digital notes in a writing-from-sources task.

The subject of this study is the course of the writing-from-sources process in a digital environment for professionals. A framework has been constructed based on the above-mentioned factors, which forms the research agenda for this dissertation. The model in question is shown in Figure 0.1

Figure 0.1. Framework of the writing-from-sources process



The subject of this study is the extent to which the characterization of the writing-from-sources process applies in a professional context and within an electronic environment.

Chapter 2

In a pilot study, we investigated the relations between note-taking *activities*, the *content* of the notes and the *quality of the text* written by professionals who had to perform a writing-from-sources task on screen.

The test subjects, seven American Masters students of Technical Communication, wrote two reports in the field of web design. They were allowed to use a website, while also being able to use a separate screen for taking notes. When they had finished reading, they were able to write the report in a new window while making use of their notes. While they wrote, they were not allowed to make use of the original sources.

The test subjects were asked to read and think out aloud. The whole process was captured on video. Protocols were constructed for the seven test subjects, in which their verbalizations were written out and the activities that they were carrying out in relation to navigation, note-taking, and writing were added to them.
The quality of the reports produced was established by asking website experts to rank the reports three times, based on three dimensions: completeness, applicability, and persuasiveness.

The study showed that the way in which test subjects make notes is linked to the task representation. Test subjects who proved to have a purpose-driven approach in which the goal, audience, and content of the report dominate, copy less from the sources, formulate their own notes more, and organize notes differently compared to test subjects who allow themselves to be influenced more by the sources. The notes of the latter group consist primarily of a list of copied citations.

The majority of the test subjects in the pilot allow themselves to be influenced more by the sources than by the task itself. This is striking in view of the fact that Masters students would be expected to read as experts. The reading behaviour of experts is after all characterized by a purpose-driven approach.

The degree to which notes were made proved to influence the quality of the reports. The greater the number of notes, the lower the quality of the advisory papers. The comments of the test subjects seemed to indicate that switching screens between reading (the screen containing the website) and writing (the window with the notepad) distracted the test subjects.

Chapter 3
The main study was designed based on the results of the pilot study. Thirty-eight test subjects wrote an advisory paper based on a website with source material. The test subjects were civil servants working for the province, or employees of the National Institute for Public Health and Environment. The test subjects had wide experience in the field as well as in public administration.

Half of the test subjects were allowed to take notes using a digital notepad (*notepad condition*), while the other half were allowed to use a marking tool (*marker condition*). Using this tool, the test subjects were able to highlight passages of text in yellow, make notes in the margin using a sticky note, and divide notes into categories that they were allowed to create themselves. The notes were able to be displayed in an overview per category or per page.

Because the test subjects had followed a strongly source-based approach in the pilot study, we wanted to see to what extent a purpose-driven approach could be stimulated by more explicitly steering the authors with respect to the text to be written. To achieve this, in this experiment half of the test subjects were presented with the most important issues of the task by inserting these issues as headings in the note-taking tool. It was expected that test subjects would work in a more purpose-driven manner than in the pilot study.

We investigated the role of notes in the writing-from-sources process. We analysed:

- The *process*: goals and activities concerning the making of notes, as well as the *cognitive load* that authors experience as a result of this process
- The *product*: the use of sources and notes for the final advisory paper
- The *effect*: the relation between the quality of the advisory papers and the process and product of note-taking

The participants were asked to think aloud throughout the whole process. To measure the cognitive load, every ten minutes test subjects were asked to indicate on a nine-point scale how difficult they were finding the task at that moment. In addition, all note-taking actions were registered in log files.
After the task was completed, test subjects were asked to fill in a questionnaire containing questions about their background, their prior knowledge, their experience and their valuation of the tool that they were allowed to use to take notes.

The verbalizations of the test subjects were written out in protocols, segmented, and coded based on the activities of the test subjects while reading, writing and taking notes.

Chapter 4
Before discussing note-taking within the writing-from-sources process in an on-screen environment, we describe the process at a more global level in both qualitative and quantitative terms.

Characteristic of the process is its active nature. Instead of processing information passively, the authors are actively engaged with the sources, based on their ideas about the task. The cognitive load as reported by the test subjects was fairly moderate, whereby a positive relation appears to exist between the cognitive load and the formulation of reading goals, and a negative relation between the cognitive load and prior knowledge of the subject matter.

Chapter 5
We analyse in detail the goals and activities concerned with note-taking. Test subjects in the marker condition proved to make far more notes than test subjects in the notepad condition. Being presented with the most important issues of the task proved to have little effect.

The notes proved to serve three types of goals:

- *Increasing understanding of the task*
  In the notepad condition, the most important condition is the paraphrasing or copying of parts from the task description to the notepad. In the marker condition, the most important activity is the marking of passages from the task description. In both conditions, test subjects copy passages from the task description to the advisory paper.

- *Restructuring information from the sources*
  In the marker condition sticky notes were used to restructure information with the purpose of constructing an outline for the final advisory paper. In the notepad condition a similar process was found. However, participants only used the notepad to restructure information from the task description rather than information from the sources as well.

- *Selecting information to be used later as arguments in the advisory paper*
  In the notepad condition, selecting information as an interim step before using this information in the advisory paper rarely occurs. In the marker condition, passages were most commonly marked. From these passages a selection was made at a later stage, based on their usability for the advisory paper, after which they were copied to the advisory paper.

Although the peak number of the note-taking activities is located at the beginning of the process in all conditions, the marker tool proved to be used throughout the whole process, while the use of the notepad was restricted almost entirely to the processing of the task description.

Chapter 6

To gain an insight into the relation between the sources, the notes and the advisory paper, we performed both a quantitative analysis and a qualitative one of the degree to which passages from the sources, whether modified or not, appear in the final advisory paper via the notes.

Only half of the passages from the notes were used in the final advisory paper. This can be partly explained through the fact that the majority of the notes were taken while reading the task description, thus did not need to be incorporated in the final advisory paper. The study showed that notes are used both to increase the understanding of the task and to gather arguments for the advisory paper. The use of the notes in the final advisory paper supports this finding.

We analysed the origin of clauses in the advisory paper. Half of the clauses in the advisory papers proved to have been derived from the sources or the notes, while the other half originated from the author's own expertise, whereby a part of these clauses are represented by structuring elements such as headings. The role of the notes is therefore relatively limited, depending on the expertise of the author.

The headings in the notes have both a planning function and a function for organizing information that needs to be included in the advisory paper. A large proportion of the headings are used to categorize information based on the central themes of the task. While they read, test subjects arrange information under headings that indicate what has to included in the advisory paper: they are headings that have a planning function.

The analysis of the 'flow' of information between sources, notes, and advisory paper shows that authors start working in a rhetorical manner because, with the goal of the text in mind, they adapt material from the sources and the notes in various ways, even though the scale on which this occurs is relatively limited. This demonstrates that authors in a professional situation adapt their texts to the target group of the text.

Chapter 7 Relation between Notes and Advice quality

In this chapter, a relation is established between the process of note-taking and the notes themselves on the one hand, and the quality of the advisory papers on the other. The advisory papers were assessed by six raters on a five-point scale, focusing on the degree to which the potential reader would follow the advice given. Three raters were experts in the subject matter (domain experts), the three other raters were lecturers of communication skills. In addition to their assessment, the raters were asked to indicate what they considered to be important when assessing advisory papers.

The analysis of the dimensions of advice quality that were considered to be most important by the raters demonstrates that the individual advisory paper that is assessed has a strong influence on what the raters consider important. For example, spelling was considered important only at the moment that a lot of spelling errors were found in the advisory paper. In that case, spelling proved to have a negative effect on the quality of the advisory papers.

The results provide few points of contact for assuming a relation between notes and the quality of the advisory papers. However, some indications were identified. A positive correlation was found between advice quality and the frequency with which citations were copied to the advisory paper, as well as a positive relation between advice quality and the number of content headings.

Chapter 8 Conclusions
In this final chapter, conclusions are drawn and recommendations made for follow-up research:

1. The writing-from-sources process of professionals is highly purpose-driven
2. In professional writing-from-sources tasks, note-taking not only serves as an aid to the comprehension of the source material, but also as a facilitator of the interpretation of the rhetorical and the content problem.
3. The extent to which cognitive effort is distributed between the individual and the notes depends on the note-taking tool writers were able to use to take notes.
4. Taking notes affects the process and the product, but affects the quality of the advisory papers to a lesser extent
5. Writers take notes most often when they have only moderate levels of prior knowledge
6. Writers engage in rhetorical reasoning to modify information from the sources via the notes to the final advisory paper

Based on these conclusions, experimental research is recommended. The effect of important factors such as the task in question, the tool with which notes are taken, and the amount of prior knowledge should be investigated further with the purpose of developing a predictive theory on writing-from-sources.

Samenvatting

Professionals in organisaties maken vaak gebruik van bronmateriaal om een beoordeling, een nota of een advies te schrijven. Deze taak, die bekend staat als *writing-from-sources*, wordt steeds vaker geheel of gedeeltelijk binnen een digitale omgeving uitgevoerd, omdat bijvoorbeeld het bronmateriaal te omvangrijk of onvoldoende doorzoekbaar is om het uit te kunnen printen.

In dit proefschrift bestuderen we de writing-from-sources taak aan de hand van het gedrag van professionals die binnen een schermomgeving een tekst moeten schrijven op basis van een website met informatie, waarbij ze met een tool aantekeningen kunnen maken.

Hoofdstuk 1
Er is weinig onderzoek gedaan naar writing-from-sources door professionals. Eerder onderzoek naar hoe professionals lezen, karakteriseert het professionele leesproces als actief, doelgericht, selectief en door voorkennis gestuurd.

Eerder onderzoek naar writing-from-sources onder leerlingen en studenten kenmerkt zich door een grote verscheidenheid aan methodologieën en afhankelijke variabelen. Hierdoor is een vergelijking van de resultaten een lastige opgave. Het onderzoek is voornamelijk uitgevoerd binnen een onderwijscontext, waardoor de bevindingen niet te generaliseren zijn naar professionele situaties. Desondanks helpen de resultaten van eerder onderzoek naar writing-from-sources om de procesvariabelen te identificeren die het meest invloed lijken te hebben:

- De taak
- De bronnen
- De rol van achtergrondkennis en ervaring
- De relatie tussen het lees- en schrijfproces
- De rol van notities

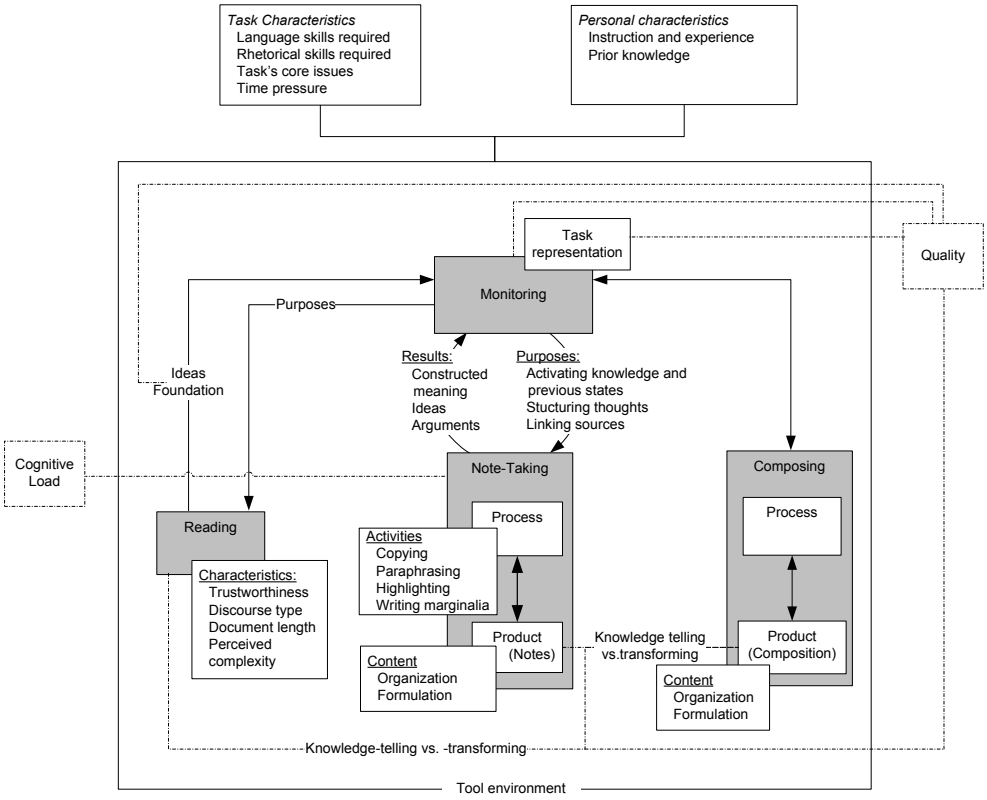
De resultaten van eerder writing-from-sources onderzoek suggereren dat bij meer gevorderde leerling-schrijvers de taak een dominante rol speelt in het hele proces, afhankelijk van de expertise van de schrijvers. Onervaren schrijvers laten zich meer leiden door de bronnen en minder door de taak, wat resulteert in een tekst die bestaat uit een verzameling ideeën (*knowledge-telling*). Ervaren schrijvers met veel voorkennis laten zich primair leiden door de taak die ze aan het uitvoeren zijn. Ze analyseren hun taak en raadplegen op basis daarvan de bronnen met als doel het verzamelen van argumenten voor de uiteindelijke taak. (*knowledge-transforming*).

Eerder onderzoek laat ook zien dat lezen en schrijven sterk aan elkaar zijn gerelateerd. Er is geen strikte fasering tussen lezen en schrijven, ook al domineert lezen aan het begin van het proces, terwijl later in het proces schrijven de belangrijkste plaats inneemt.

Er is nog weinig onderzoek gedaan naar het maken van aantekeningen in een elektronische omgeving. Het beschikbare onderzoek schetst een beeld van nieuwe mogelijkheden, maar ook van complexe bediening van notitietools en een sterke voorkeur van lezers voor aantekeningen op papier. Zeer weinig is nog bekend over de rol van digitale aantekeningen binnen een writing-from-sources taak.

Het verloop van het writing-from-sources proces in een digitale omgeving bij professionals is het onderwerp van dit onderzoek. Op basis van de bovengenoemde factoren is een framework geformuleerd, dat de onderzoeksagenda voor dit proefschrift vormt. Het model is afgebeeld in Figuur 0.1

Figuur 0.1. Framework van het writing-from-sources proces



In hoeverre de karakterisering van het writing-from-sources proces standhoudt in een professionele context en binnen een elektronische omgeving, is het onderwerp van dit onderzoek.

Hoofdstuk 2

In een pilotstudie zijn de relaties tussen notitie-*activiteiten*, de *inhoud* van de notities en *tekstkwaliteit* onderzocht bij professionals die op het scherm een writing-from-sources taak moesten uitvoeren.

De proefpersonen, zeven Amerikaanse Master-studenten Technische Communi-catie, hebben twee adviezen geschreven op het gebied van websiteontwerp. Ze konden hiervoor gebruik maken van een website, waarbij ze in een apart scherm aantekeningen konden maken.

Als ze klaar waren met lezen, konden ze met gebruik van hun aantekeningen in een nieuw venster het advies schrijven. Tijdens het schrijven mochten ze geen gebruik meer maken van de bronnen.

Aan de proefpersonen werd gevraagd hardop te denken en te lezen. Het hele proces werd vastgelegd op video. Van de zeven proefpersonen werden protocollen opgesteld, waarin hun verbalisaties werden uitgeschreven en waaraan de activiteiten die ze uitvoerden met betrekking tot navigatie, aantekeningen maken en schrijven werden toegevoegd. De kwaliteit van de geproduceerde adviezen is vastgesteld door website-experts te vragen om de adviezen drie keer te sorteren op basis van drie dimensies: volledigheid, toepasbaarheid en overtuigingskracht.

Uit dit onderzoek bleek dat de manier waarop proefpersonen aantekeningen maken samenhangt met hun taakopvatting. Proefpersonen die blijk hebben gegeven van een doelgerichte aanpak waarin doel, publiek en inhoud van het advies de boventoon voeren, kopiëren minder uit hun bronnen, formuleren meer eigen notities en organiseren hun notities anders dan proefpersonen, die zich meer laten leiden door de bronnen. Hun notities bestaan primair uit een lijst van gekopieerde citaten.

De meeste proefpersonen in de pilot laten zich meer leiden door de bronnen dan door de taak. Dit is opvallend, aangezien van master-studenten verwacht werd dat ze als experts zouden lezen. Het leesgedrag van experts kenmerkt zich juist door een doelgerichte aanpak.

De mate waarin aantekeningen werden gemaakt bleek de kwaliteit van de adviezen te beïnvloeden. Hoe groter het aantal notities, hoe lager de kwaliteit van de adviezen. De commentaren van de proefpersonen leken erop te duiden dat het van scherm wisselen tussen lezen (het scherm met de website) en schrijven (het venster met het kladblok) de proefpersonen heeft afgeleid.

Hoofdstuk 3

Op basis van de resultaten van de pilotstudie is het hoofdonderzoek opgezet. Achtendertig proefpersonen schreven een advies op basis van een omvangrijke website met bronmateriaal. De proefpersonen waren provincieambtenaren of medewerkers van het RIVM. De proefpersonen hadden veel ervaring in het veld en in het openbaar bestuur.

De helft van de proefpersonen konden aantekeningen maken met een digitaal kladblok (*kladblokconditie*), terwijl de andere helft een markeertool kon gebruiken (*markeerconditie*). Met deze tool konden proefpersonen passages geel markeren, notities in de marge zetten met een geeltje en notities indelen in categorieën, die ze zelf konden creëren. De notities konden worden weergegeven in een overzicht per categorie of per pagina.

Omdat in de pilotstudie proefpersonen een sterke brongerichte aanpak volgden, is nagegaan in hoeverre een doelgerichte aanpak kon worden gestimuleerd door de schrijvers nadrukkelijker te oriënteren op de te schrijven tekst. Daartoe werd in dit experiment aan de helft van de proefpersonen de belangrijkste issues van de taak aangereikt door ze als kopjes te vermelden in de notitietool. Het werd verwacht dat proefpersonen meer doelgericht te werk zouden gaan dan in de pilot studie.

Onderzocht is de rol van notities in het writing-from-sources proces. In het pilot-onderzoek zijn de volgende aspecten geanalyseerd:

- Het *proces*: doelen en activiteiten rondom het maken van aantekeningen, als ook de *cognitieve belasting* die schrijvers ervaren als gevolg van dit proces
- Het *product*: het gebruik van bronnen en notities voor het uiteindelijke advies

- Het *effect*: de relatie tussen de kwaliteit van de adviezen en het proces en product van notities

Proefpersonen werd gevraagd om hardop te denken gedurende het hele proces. Om de cognitieve belasting te meten werd elke tien minuten aan proefpersonen gevraagd om op een negen puntsschaal aan te geven hoe moeilijk de taak voor hun was op dat moment. In logbestanden zijn verder alle notitieacties geregistreerd.

Na afloop van de taak werd aan proefpersonen gevraagd een vragenlijst in te vullen met daarin vragen over hun achtergrond, hun voorkennis, hun ervaring en hun waardering voor de tool die ze konden gebruiken om aantekeningen te maken.

De verbalisaties van de proefpersonen zijn uitgeschreven in protocollen, gesegmenteerd en gecodeerd op basis van de activiteiten van de proefpersonen tijdens het lezen, het schrijven en het nemen van notities.

Hoofdstuk 4
Voordat ingegaan wordt op de rol van notities binnen het writing-from-sources proces in een schermomgeving, beschrijven we het proces op een globaler niveau zowel kwalitatief als kwantitatief.

Kenmerkend is de actieve aard van het proces. In plaats van passief informatie verwerken, zijn de schrijvers actief bezig met de bronnen gebaseerd op hun ideeën over de taak. De door proefpersonen gerapporteerde cognitieve belasting was vrij gematigd, waarbij er een positief verband lijkt te zijn tussen de cognitieve belasting en het formuleren van leesdoelen en een negatief verband tussen de cognitieve belasting en vakinhoudelijke voorkennis.

Hoofdstuk 5
We analyseren in detail de doelen en de activiteiten rondom het maken van notities. Proefpersonen in de markeerconditie bleken veel meer aantekeningen te maken dan proefpersonen in de kladblokconditie. Het aanreiken van de belangrijkste issues van de taak bleek weinig effect te hebben.

De notities bleken gebruikt te worden voor drie typen doeleinden:

- *Vergroten van het begrip van de taak*
  In de kladblokconditie is de belangrijkste activiteit het parafraseren of kopiëren van delen uit de taakomschrijving naar het kladblok. In de markeer-conditie is de belangrijkste activiteit het markeren van passages uit de taakomschrijving. In beide condities kopiëren proefpersonen passages uit de taakomschrijving naar het advies

- *Herstructureren van informatie uit de bronnen*
  In de markeerconditie werden geeltjes gebruikt om informatie te herstructu-reren met als doel een bouwplan op te zetten voor het uiteindelijke advies. In de kladblokconditie was een vergelijkbaar proces zichtbaar. Echter, proef-personen in deze conditie gebruikten het kladblok alleen om informatie uit de taakomschrijving te herstructureren.

- *Selecteren van informatie om later als argumenten in het advies op te nemen*
  In de kladblokconditie komt de selectie van informatie als tussenstap voorafgaand aan het gebruik van die informatie in het advies maar weinig voor. In de markeerconditie werden vooral passages gemarkeerd. Uit deze passages werd later een selectie gemaakt op basis van hun bruikbaarheid voor het advies, waarnaar ze naar het advies werden gekopieerd.

Hoewel het zwaartepunt van de notitieactiviteiten in alle condities aan het begin van het proces ligt, bleek de markeertool door het hele proces heen gebruikt te worden, terwijl het gebruik van kladblok zich vrijwel beperkte tot de verwerking van de taak-omschrijving.

Hoofdstuk 6
Om inzicht te krijgen in de relatie tussen de bronnen, de notities en het advies is een kwantitatieve en kwalitatieve analyse uitgevoerd van de mate waarin passages uit de bronnen al dan niet in aangepaste vorm via de notities terecht komen in het uitein-delijke advies.

Slechts de helft van de passages uit de notities bleek uiteindelijk ook in het advies te worden gebruikt. Dit gegeven kan deels verklaard worden uit het feit dat de meeste notities tijdens het lezen van de taakomschrijving zijn gemaakt en daarom dus niet in het advies terecht hoeven te komen. Uit het onderzoek is gebleken dat notities zowel dienen om het begrip van de taak te vergroten als om argumenten te verzamelen voor het advies. Het gebruik van de notities in het uiteindelijke advies ondersteunt deze bevinding.

We analyseerden tevens de herkomst van clauses in het advies. De helft van de clauses in de adviezen bleek te zijn afgeleid van de bronnen of de notities, terwijl de andere helft een weerslag vormt van de eigen expertise van de schrijver, waarbij een deel van deze clauses voor rekening komt van structurende elementen als kopjes. De rol van notities is dus relatief beperkt gebleven, afhankelijk van de expertise van de schrijver.

De kopjes in de notities hebben zowel een planningsfunctie als een functie voor het organizeren van informatie die moet worden opgenomen in het advies. Een groot deel van de kopjes wordt gebruikt om informatie te categoriseren op basis van de centrale thema's van de taak. Bij het lezen scharen proefpersonen informatie onder kopjes die aangeven wat er in het advies moet komen: het zijn kopjes met een planningsfunctie.

De analyse van de 'flow' van informatie tussen bronnen, notities en advies laat zien dat schrijvers retorisch te werk gaan doordat ze met het doel van de tekst voor ogen op diverse manieren materiaal uit de bronnen en de notities aanpassen, ook al is de schaal waarop dit gebeurt relatief beperkt. Het laat zien dat schrijvers in een professionele situatie hun teksten afstemmen op de doelgroep van de tekst.

Hoofdstuk 7 Relatie tussen Notities en Advieskwaliteit
In dit hoofdstuk wordt een relatie gelegd tussen het proces van notities nemen en de notities zelf aan de ene kant en de kwaliteit van de adviezen aan de andere kant. De adviezen zijn door zes beoordelaars beoordeeld op een vijfpuntsschaal, gefocust op de mate waarin de beoogde lezer het advies zou opvolgen. Drie beoordelaars waren inhoudelijke experts, de drie andere beoordelaars waren docenten communicatieve vaardigheden. Naast hun beoordeling werd aan beoordelaars ook gevraagd om aan te geven wat belangrijk was bij het beoordelen van adviezen.

De analyse van de dimensies van advieskwaliteit die het meest belangrijk werden gevonden door de beoordelaars laat zien dat het individuele advies dat wordt beoordeeld een sterke invloed heeft op wat de beoordelaars belangrijk vinden. Bijvoorbeeld spelling werd pas belangrijk gevonden op het moment dat er veel spelfouten in het advies zaten. In dat geval bleek spelling tegelijk een negatief effect op de kwaliteit van de adviezen te hebben.

De resultaten geven weinig aanknopingspunten om een relatie tussen notities en de kwaliteit van de adviezen te veronderstellen. Desondanks zijn enkele aanwijzingen gevonden. Een positieve correlatie werd gevonden tussen advieskwaliteit en de frequentie waarmee citaten werden gekopieerd naar het advies evenals een positieve relatie tussen advieskwaliteit en het aantal inhoudelijke kopjes.

Hoofdstuk 8 Conclusies
In dit laatste hoofdstuk worden conclusies getrokken en suggesties gedaan voor vervolgonderzoek:

1. Het writing-from-sources proces van professionals is sterk doelgericht
2. In professionele writing-from-sources taken omvat de encoding functie van aantekeningen maken niet alleen hulp bij het begrip van het materiaal, maar ook het faciliteren van de interpretatie van het retorische en het inhoudelijke probleem
3. De mate waarin cognitieve inspanning gedistribueerd kan worden tussen het individu en de aantekeningen is afhankelijk van de tool die schrijvers konden gebruiken om aantekeningen te maken
4. Aantekeningen maken beïnvloedt het proces en het product, maar heeft slechts marginaal invloed op de kwaliteit van de adviezen
5. Schrijvers maken het meest frequent aantekeningen als ze een gematigde hoeveelheid voorkennis hebben
6. Schrijvers gaan retorische redeneringen aan om informatie vanuit de bronnen via de notities aan te passen voor het uiteindelijke advies

Op basis van deze conclusies wordt experimenteel onderzoek voorgesteld, dat het effect van belangrijke factoren als de aangereikte taak, de tool om aantekeningen te maken en de hoeveelheid voorkennis verder onderzoekt met als doel de ontwikkeling van een voorspellende theorie over writing-from-sources.

Appendix Selecting Studies on Writing-from-Sources

Appendix

A

In Chapter 1 the findings of previous research on writing-from-sources were addressed. To increase our understanding of the writing-from-sources process, we have searched for articles on the writing-from-sources process. The literature databases we used were ScienceDirect, Swetswise, ERIC, PsychInfo, WebOfScience as well as PiCarta (an integrated catalogue of all Dutch libraries). The following set of predefined keywords was used to retrieve articles from the various databases that matched our criteria:

- Academic writing
- Composition
- Discourse synthesis
- Reading
- Reading to write
- Writing
- Writing across the curriculum
- Writing in the disciplines

WebOfScience was used to find studies that referred to the ones we already found. Additionally, studies with which the authors were already familiar were included in the analysis when they met the criteria.
We included all studies that involve reading of one or more sources combined with composing a text based on these sources. We selected only *empirical* studies, and excluded for instance purely theoretical or discourse-philosophical reflections, anecdotical articles, and best practice reports, since empirical studies shed light on the focus of our study – the way in which people actually carry out writing-from-sources tasks.

Most empirical studies are published in journal articles. Book chapters and other types of publications were only included when a reference was made in another study to that publication. In such a way, we were able to retrieve the most important non-journal publications. Searching and retrieving non-journal publications is difficult since they are poorly indexed and often not available through normal library systems.

In sum, 35 articles were found. *Written Communication* (10 articles), *Reading Research Quarterly* (5 articles), and *Journal of Educational Psychology* (3 articles) were the journals that contributed most to the set of articles in this review.

We have summarized the studies in table A.1.

Study	*Purpose*	*Participants* [a]	*Tasks*	*Methodology*	*Dependent variables and data-analysis*
Aghbar & Chitrapu (1997)	Exploring the effect of teaching for 'voice'	18x UG (ESL)	- a 2 hour training - writing 2 (draft) essays based on short articles	Comparing presence of voice elements between draft versions of the essays	Presence of voice elements
Bereiter & Scardamalia (1984)	Investigating the knowledge gained by students from exposure to literary types	Exp 1: 17 + 16 + 18 ES Exp 2: 16 + 15 + 28 ES Exp 3: 33 + 28 ES + 22 graduate students	Exp 1: Creating suspense by rewriting original story after reading (in 2 conditions) model suspense stories Exp 2: indicate amount of exposure to restaurant review + essential components of such a review, writing model review, reading model review, rewriting review, writing rules for instruction of how to write reviews Exp 3: read model piece of concrete fiction, list its distinguishing characteristics, write an original piece of concrete fiction, write rules for the genre	Conditions Exp. 1: - Stimulus (5 suspense principles, reading model story, principles + model story) - Grade level (3/4, 5/6, 7) Conditions Exp. 2: - Grade level (5, 6, 7) Conditions Exp. 3: - Grade level (5/6, 7, graduate)	Exp 1: - Ratings of level of suspense (5 point scale) between treatments and grade levels - Ratings of application of principles (4 points scale) Exp. 2: - comparing number of content and literary items between grade level and pre- and post exposure to model Exp. 3: - search for patterns between groups of students. No statistical analysis.

Study	*Purpose*	*Participants*	*Tasks*	*Methodology*	*Dependent variables and data-analysis*
Breetvelt et al. (1994)	Investigate the relations between cognitive activities and text quality	20 HS	Writing 2 argumentative essays	Method: Think aloud protocols. Multi-level analysis of variance.	- Text quality on four aspects - Frequencies of Cognitive activities distributed over time (predictors)
Campbell (1990)	Explore the writing-from-sources process for native and ESL speakers	30 Subjects either enrolled in ESL composition course or native speakers	Writing of a draft explanatory essay based on a textbook chapter	Conditions: less proficient, proficient, native; Method: Content analysis	- Type, function of excerpts in which sources were used related to position within the essay - References - Holistic quality scores
Chambliss et al. (2003)	Exploring whether explanations as a genre promote critical reasoning about a scientific causal model	20 x ES	Writing an explanation for next year's students based on reading prepared explanations during 2 x 6 classroom sessions (6 x reading explanations together, 6 x writing own explanations)	Method: Textual analysis of students' writings	Analysis of T-units regarding - reader orientation -the occurrence of subexplanations, - the logical order of the subexplanations, - source of T-units in the source texts
Connor & Kramer (1995)	Comparing task representations between native speakers and ESL	3 ESL and 2 native students	Writing a case report based on the reading of a business case	Method: Case studies, based on interviews and analysis of notes, drafts, sources	Qualitative interpretive analysis

Study	*Purpose*	*Participants*	*Tasks*	*Methodology*	*Dependent variables and data-analysis*
Durst (1989)	Examining the monitoring processes in analytic and summary writing	20 x HS	Writing 2 essays based on passages from a history textbook: one analytic, one chronological summary essay	Conditions: High and average ability students Mehod: Multivariate analysis of variance	Frequency of communication units by type and time in the process
Greene (1993)	Examine how different writing tasks influence students' thinking in reading and writing	15 x UG	Writing a report or a problem-based essay	Conditions: -Task (report, problem-based essay) Method: Think-aloud	- Reading-writing times - Protocol fragments on task interpretations - Knowledge post test (non-delayed, and delayed) - Essay organization (top-level structure, origin of information, appeals to authority)
Kennedy (1985)	- Identification of purposeful behavior during the stages of the reading-writing process. - Comparison of fluent vs. non-fluent readers	6 x UG	Writing an objective essay based on the materials	Conditions: Fluent vs. non-fluent readers Method: Think aloud	Frequency of protocol segments with respect to reading, higher-order processing, process phase, and taking notes

Study	*Purpose*	*Participants*	*Tasks*	*Methodology*	*Dependent variables and data-analysis*
Langer (1986)	Inventory of the processes applied during reading and writing	67 x ES and HS	Reading and writing a story and a report during in sum 5 sessions based on stories and reports with different complexity, depending on condition	Conditions: - Concurrent vs. retrospective think aloud - Easy passages vs. difficult passages - Grade (3, 6, 9) Method Interpretative analysis of communication units	Frequencies of communication units with respect to reasoning operations, process phase
Lewkowicz (1994)	Assess how non-native speakers differ in writing when they can or cannot use sources	75 x ESL	Writing an essay based on a single source or no source	Conditions: - with and without source texts. Method: - analsyis of use of sources, notes and final essays	- Essay quality (length, number and extent of elaboration, success/failure to substantiate a point) - Use of information
Many et al. (1996)	Discovering patterns in the reading-writing-research process of 11 year-old-students as they investigate a topic	27 x ES	Conducting a research project as part of class project work	Method: - Naturalistic observation in the classroom, longitudional study based on interviews and document analysis - Selection of key informants	Grounded theory analysis. Focus on task impressions

Study	Purpose	Participants	Tasks	Methodology	Dependent variables and data-analysis
Mathison (1996)	Examining how undergraduate students read the text of an author to construct their own positions, signaling their valuation of his treatment of a topic	32 x UG, various years and majors	Writing a short critique based on a scholarly article after explicit instruction in classroom in a seven day period		- Type of evaluative commentary - Source of support for comments - Length - Text configuration (either topics and comments integrated or separated) - Holistic quality ratings
McCarthy Young & Leinhardt (1998)	Describe the development over time in historical essay writing with respect to document use and organization	5x HS	Responding to 4 evaluatory essay questions to be answered based on multiple sources.	Method: - Longitudinal study based on text analyses. - Case studies	- patterns describing macrostructure of the texts (list, specified list, causal) - patterns connecting idea units on micro level (list constructor, exemplar, equivalence, place holder, causal, qualifier) - Use of documents, use of citations
McGinley (1992)	Describing the composition process and the differences between readers' performance	7 x UG	Writing a persuasive essay of first draft quality based on two articles with a pro-con structure	Method: Recorded think-aloud; debriefing interview	Frequency of communication units with respect to reading/writing activities over time

Study	Purpose	Participants	Tasks	Methodology	Dependent variables and data-analysis
Melenhorst et al. (2005)	Exploring whether the quality of substantiated recommendations can be traced back to the process and contents of the notes	7 x Ma with professional experience	Writing recommendations on two technical communication issues based on 5 lengthy sources	Conditions: Within subjects design: - Task with and without explicit criteria Method: - Think aloud	Advice quality on three dimensions correlated with: - Frequency of note-taking fragments - The degree of transformation from sources to notes (used verbatim versus modified) - Organization of the notes (themes from task description, article-wise, unstructured)
Nelson & Hayes (1988)	Exploration of skills and strategies invoked when students engage in a writing-from-sources task	Exp 1: 8 x UG and 8 advanced writers. Exp 2: 8 x UG	Exp 1: writing an analytic term paper based on sources available in the library Exp 2: providing logs	Conditions: ? Method: Exp 1: Think aloud Exp 2: Logs	Broad qualitative analysis In-depth analysis of cases

Study	Purpose	Participants [c]	Tasks	Methodology	Dependent variables and data-analysis
Newell & Winograd (1995)	Examining the effect of three study conditions on high-school students' learning from text	First stage: 2 HS classrooms (35 and 28 students) Second stage: 22 x HS	- Free-association task based on 5 stimulus concepts	Conditions (second stage): - Study condition (review only, study question, analytic essay writing)	First stage: Qualitative case study and observational techniques seeking patterns of instruction in US history classes Second stage: - Concept application - Immediate recall - Delayed recall
O'Hara et al. (2002)	Exploring the interaction with material artifacts and their impact on cognitive processes	12 x Professionals	Everyday real-life professional writing-from-sources tasks in various stages of completion	Method: - Document analysis - Interviews	Qualitative analysis
Penrose (1992)	Exploring the writing-to-learn assumption by examining the effect influence of task interpretation on writing and studying as learning aids	40 x UG	- Reading-to-write - Reading-to-study - Comprehension questions on source materials	Conditions: - Task (writing and studying) - Passage (factual/narrative, analytic) Method: - Think aloud protocols	- Coding protocols based on a taxonomy of cognitive operations - Coding writing activities, distinguishing between writing notes, writing paraphrases in the paper and writing constructive summaries in the paper

Study	Purpose	Participants [c]	Tasks	Methodology	Dependent variables and data-analysis
Penrose (1992) (*Continued*)				Method: - Think aloud protocols	- Comprehension test scores (short-answer or multiple choice questions) Data-analysis: Analysis of variance
Perin (2003)	Investigate the effects of text density, prior knowledge, and literacy on composition of an informational report	209 remedial students in community college	Writing a one-page informational report based on two source-texts - General literacy task to measure reading and writing ability - Free association task to measure prior knowledge	Conditions: - Topic (4x) - High density vs. low density Within subjects design (2 topics per participant, one high, one low density)	Analyses of variance, comparing - low and high density; - low and high reading/writing ability (median split) and; - low and high prior knowledge (median split) with variables - no. of sentences in writing sample, - proportion of sentences referring to as well as the and proportion copied from the source texts - proportion of sentences accurately representing information in the source texts

Study	Purpose	Participants [c]	Tasks	Methodology	Dependent variables and data-analysis
Risemberg (1996)	Investigate self-regulated learning strategies and self-efficacy contribute to writing quality	71 x UG	- Reading two source texts, quality quidelines, and model essays - Writing a comparison/contrast essay based on the source texts	Method: - Correlational and regression analysis	Correlation and regression analysis, relating the following variables to essay quality (in terms of the no. of comparison and contrast elements): - organizing/transforming in the essays (as measured by level of organization in the pre-writing notes) - reading ability (based on a reading comprehension test) - task-information seeking (time spent on model essays) - self-efficacy for writing
Rouet et al. (1996)	Investigate students' ability to reason about and with documents when learning about historical controversies	24 x UG	Writing opinion on 4 controversial issues based on 7 documents of four historical genres	Conditions: - Document set with or without primary historical documents	- Ranking of trustworthiness of the documents, written justifications for these rankings - Number of references by document type - Type of statement (claim, evaluation, psychological event, fact)

Study	Purpose	Participants [c]	Tasks	Methodology	Dependent variables and data-analysis
Segev-Miller (2004)	Investigate the effect of strategy instruction on process and product	24 Teachers/MA candidates	Essay writing at start and end of year. Instruction on writing-from-sources strategies. Maintaining process log. Self-assessment of essays written prior to and after instruction	Method: - Process logs - Content analysis of essays	Data-analysis: - Creating an inventory of assessment categories by means of content analysis - Conducting t-tests to measure differences between pre- and post-instruction self-assessment
Slattery & Kowalski (1998)	Examining the questions whether first-year students and upper-level students develop and use differing types of writing strategies when they compose with a computer	140 x UG	Writing argumentative an essay First-year courses: based on the analysis of several assigned essays Upper-level courses: one teacher emphasized using academic discourse, the other popular writing	Condition: - Participants in first courses vs. in upper level courses Method: - Naturalistic observation in class-room - Pre and post-course questionnaire	Document analysis of drafts, writing process reports. Analysis of pre- and post-course questionnaire reports

Study	Purpose	Participants [c]	Tasks	Methodology	Dependent variables and data-analysis
Spivey & King (1989)	Analyze differences in the writing-from-sources for three grade levels	60 x ES, HS	- Writing a list with ideas, associations around the essay's theme prior to the task - Writing a report to inform adults and teenagers about the theme, based on descriptive readings	Conditions: - Grade level (6^{th}, 8^{th}, 10^{th}) - Accomplished vs. less accomplished	- Number of content units in the essays - Breadth/depth ratio in the essays, as a measure for the essays' organization - Connectivity (number of operations for the reader to connect content units divided by the total number of content units) - Holistic quality - Process planning (4 point scale) - Retranscription (measure for revision across draft versions)
Stahl et al. (1996)	Describe the process of writing from historical sources with respect to information processing in general and the combination of information from multiple sources in particular	44 x HS	- Reading sources on screen, - Writing task (either opinion or description), separated from reading as going back was not allowed - Relationship task (indicating strength of relationship between 2 keywords) related to the topic of reading	Conditions: - Purpose (opinion forming, topic description) - Topic (two topics related to the Vietnam war) Method: 18 students working in groups, remainder individually.	- Categorizing idea units from notes and essays based on principles of Grounded Theory - Quantitative analysis of the outcomes of the relationship task - Comparison of mental models with expert models

Study	Purpose	Participants [c]	Tasks	Methodology	Dependent variables and data-analysis
Stahl et al. (1996) *(Continued)*			- Note-taking was allowed on screen and paper. - Free recall		- Qualitative analysis of the flow of ideas from documents through notes to final product - Discriminant analysis between opinion and description task on students who took notes - Quantitative analysis of notes categorized as sourcing, corroboration, contextualization - Qualitative textual analysis of final essays
Stapleton (2001)	Model for assessing critical thinking in writing by L2 learners	45 x UG	Writing an argumentative essay based on a 300 word essay	<u>Conditions:</u> Familiar vs. unfamiliar topic	- Number of arguments - Elements of critical thinking
Taylor (1982)	Investigating the effects of text structure	48 x ES	- Summarization: 7 times once a week instruction. - Reading & summarizing - Discussing summarization with teacher. - Free recall	<u>Conditions:</u> - Competent vs. non-competent readers - Instruction for hierarchical summarization vs. instruction by answering practice questions Replication in second experiment, yielding same results	- Recall - Organization - Question answers

Study	Purpose	Participants [c]	Tasks	Methodology	Dependent variables and data-analysis
Tierney et al. (1990)	Investigate whether writing combined with reading leads to more critical thinking than reading/writing alone?	137 x UG	Writing a letter to the editor	Conditions: - Introduction writing, no introduction writing - background knowledge activation, no activation - reading vs. no reading of sources, - questions/no questions before writing the letter	- Scope and quality of content - Organization - Style, tone, appropriate wording - Mechanics and usage - General impression - Overall effect - Number of words - Number of T units - Types of revisions (in those conditions)
Voss & Wiley (1997)	Explore how students select information from sources	96 x UG	History essay writing task based on 8 different sources Rating importance of elements in materials	Conditions: - Essay type (history, narrative, argument) - Task order (importance-essay or v.v.)	- Importance ratings - Number of connectives - Number of causal connections - Transformations from original content - Number of idea units

Study	Purpose	Participants [c]	Tasks	Methodology	Dependent variables and data-analysis
Wiley & Voss (1999)	Exploring the effect of presentation format and assignment on students' essays	64 x UG	Exp 1: writing an essay (argument, explanation, narrative, summary) based on either a website or a textbook chapter Exp 2: writing an essay (argument, narrative) based on either a website or a textbook chapter (which was considered an argument itself)	Conditions: - Source type, - Writing instruction Exp. 2: - Presentation format (computer, paper) Method: Textual analysis of writings	- Origin of sentences - Number of sentences - Connectives - Recognition - Correct verifications of inferences and smiliarities
Yang (2002)	Quantifying the cognitive process of discourse synthesis within a hypermedia learning environment	6 x UG	Developing opinions on 2 problems, implying these steps: define problem, formulate hypotheses, collect, synthesize and reformulate info from the Perseus database	Method: Think aloud	- Grounded theory. Qualitative description with respect to reasoning, affective elements, reflection, structuring, intertextual operations based on a taxonomy of learners' cognitive processing
Yang & Shi (2003)	Exploring the summary writing process of native vs. non-native speakers	6 x MBA	Understanding the writing processes of MBA students, in particular ESL students	Method: Think aloud	- Coding frequencies with respect to the parts of the writing processes - Protocol fragments supporting quantitative results

[a] ES = Elementary school students; HS = High school students; UG = Undergraduate students; Ma=Master students

Appendix Terminology Related to the Task Topic

Appendix
B

In this appendix we provide an overview of the terminology regarding the topic of the task that is used in this study. Unfortuantely, some of the terms cannot be translated to English, because they are highly specific to the Dutch situation and hence do not have English counterparts. In that case, the Dutch terms are used. However, a short de-scription of what the term refers to is displayed in this Appendix.

Table B.1
Terminology Related to the Task Topic

Dutch term	English term	Meaning
Vijfde Nota Ruimtelijke Ordening, Vijfde Nota RO, vijno	Fifth Memorandum on Spatial Planning, Fifth Memorandum SP	Dutch policy document that outlines the policy on spatial planning in the Netherlands
Nota Ruimte	-	Successor of the Vijfde Nota
Hoofdlijnenakkoord	Coalition agreement	Agreement between the parties participating in the cabinet
Rode contouren	Red contours	Areas that fulfill a traffic, housing, or business function
Groene contouren	Groene contouren	Natural landscapes
Gedeputeerde	-	Member of the provincial executive
Ecologische Hoofdstructuur, EHS	Dutch Mainframe of Natural Landscapes, EHS	Areas that have been assigned the status of valuable natural landscapes.
Bestemmingsplan	Development plan	Policy document in which the function of areas is outlined (that is, housing, park/nature, business, and so on).
Contourenbeleid	Contour policy	The policy, defined in the Fifth Memorandum, in which the red and green contours have been defined.

Appendix Questionnaire for the Main Study

Appendix C

This appendix contains the questionnaire we provided to our participants. The questionnaire displayed here has been translated from the Dutch.

Questionnaire Participant no. _____ Condition 1

Finally, we would like to ask you to fill out this questionnaire

1 What is your gender? ☐ Male ☐ Female

2 How old are you? _____

3 What is your highest level of successfully completed education? *If you graduated from MBO, HBO or WO, please list the programmes you took.*[1]

☐ LBO
☐ Mavo
☐ Havo
☐ VWO
☐ MBO _____
☐ HBO _____
☐ WO _____

4 How much experience do you have with writing advisory papers?

☐ Very little
☐ Little
☐ Not much, not little
☐ Much
☐ Very much

5 How long (no. of years) have you been working within public administration? _____

How long (no. of years) have you been working within the field of spatial planning and environment? _____

6 How often do you use internet at your workplace?

- ☐ Several times a day
- ☐ Once a day
- ☐ Several times a week
- ☐ Once a week
- ☐ Less than once a week

7 How long have you been using internet at your workplace?
Approximately _____ yrs.

8 For each of the following statements, please indicate the extent to which you agree with the statement. Please circle the most appropriate answer

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
iMarkup is easy to use	1	2	3	4	5
It is difficult to learn how to use iMarkup within a short period of time	1	2	3	4	5
It is fun to use iMarkup	1	2	3	4	5
I want to keep using iMarkup for my daily work	1	2	3	4	5

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Using iMarkup I read in a more efficiënt manner than without iMarkup	1	2	3	4	5
iMarkup made it easier for me to compose the advisory paper	1	2	3	4	5
My advisory paper has improved due to iMarkup	1	2	3	4	5

Without iMarkup I would have finished earlier	1	2	3	4	5

9 The following statements concern your advisory paper. Again, please circle your choice.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The gedeputeerde is very likely to accept my recommendations	1	2	3	4	5
All the gedeputeerde's questions have been addressed in my advisory paper	1	2	3	4	5
The gedeputeerde is able to make good use of my recommendations	1	2	3	4	5
I regularly give advice on landscape planning and nature	1	2	3	4	5
I am well aware of the policy regarding landscape planning and nature	1	2	3	4	5
I had some ideas about potential measures and their consequences right away	1	2	3	4	5
My perception of the consequences of the EHS for provinces has changed	1	2	3	4	5

10 The material you were able to use for your advisory paper are listed below. For each publication please indicate whether you are familiar with it or not.

- *Who's afraid of Red, Green, and Blue. Toets 5e Nota Ruimtelijke Ordening* [Who's afraid of Red, Green, and Blue Assessment of the Fifth Memorandum on Spatial Planning]	☐	Yes
	☐	No
- *Milieu en natuur. Reactie op het Hoofdlijnenakkoord Balkenende II.* [Environment and nature. Response to the Coalition agreement Balkenende II]	☐	Yes
	☐	No
- *Klimaatverandering extra reden voor samenhang van natuurgebieden* [Climate change additional reason for integration of natural landscapes]	☐	Yes
	☐	No
- *Milieu- en Natuurcompendium* [Environmental data compendium]	☐	Yes
	☐	No

- *Planologische bescherming in de EHS; Toenemende druk door intensivering 'rode' functies in natuur.* [Planological protection within the EHS; increasing pressure due to more intense 'red' functions within natural landscapes]

☐	Yes
☐	No

Do you have any additional remarks concerning your experiences with iMarkup for this advice writing task or about this study?

[1] LBO = lower vocational education; Mavo = lower general secondary education; Havo = higher general secondary education; VWO = pre-university secondary education; MBO = intermediate vocational education; HBO=higher vocational education; WO = college education

Appendix

D

Appendix Coding Scheme for the Think-Aloud Protocols

A selection of 12 think-aloud protocols was analysed in detail. They were transcribed, divided into communication units and subsequently coded. The scheme we used to code the protocols is displayed in this Appendix.

Table D.1
Activities or Decisions Related to the Monitor

Category	Definition	Examples	Source
Interpreting the rhetorical problem	Units in which the participant reflects on the recipient's intentions, the implications of the recipient's political situation, or the genre the participant is supposed to adhere to	"ja dan denk ik dit weer lezende dat ik toch gewoon eh dat eh gedeputeerde een he politiek antwoord zou geven" "ehm ik zit het al te verwoorden als een antwoord van de gedeputeerde terwijl de vraag is om alleen basisinformatie te geven dus dan moet ik me daartoe eh beperken"	
Stating present or future reading goals	Units in which the participant indicates or explains what he wants to read to answer his/her questions related to genre, content, or text.	"dan ga ik dan nu dat artikeloverzicht even o dat was wat ik daarstraks had" "ik ben eigenlijk op zoek naar een eh meer beleidsmatige invalshoek" "ja dan zou je moeten weten welke van die steden in Gelderland ligt welke van die stedelijke netwerken maar goed"	*Adapted from* Langer (1986); McGinley (1992)
Stating composition goals	Units in which the participant indicates or explains the contents he wants to compose about in his advisory paper	"de vijfde nota ro nou dan moet er nog een stel algemene mooie zinnen komen" "eh moet je dan nog iets over zeggen eh over de noodzaak van die wonen werk en verkeer"	*Adapted from* Langer (1986)

Table D.1 (*Continued*)

Category	Definition	Examples	Source
Evaluating task progress	Units in which the participant assesses how far (s)he has progressed in his/her task or parts of the task until now	"nou ik heb het af" "ehm ja dan heb ik alles gehad he"	
Use of rhetorical and topic knowledge	Units in which the reader synthesizes, generalizes, or classifies content, relates content to his own personal knowledge, or is reasoning beyond the task and the sources using his personal topic or rhetorical knowledge	"ehm de ambities uit de vijfde nota komen overeen met onze ideeën over woningbouw en bedrijventerreinen"	*Adapted from* McGinley (1992)

Table D.2
Activities or Decisions Related to the Subprocess of Reading

Category	Definition	Examples	Source
Reading the task description	Units in which the participant is reading or re-reading the task description	-	Breetvelt et al. (1994)
Verbalizing reading and paraphrasing	Units in which the participant reads a passage from the sources or reformulates it in his own words		
Evaluating content of reading	Units in which the participant assesses the value of a claim in terms of relevance, correctness or the trustworthiness of the source	"ja daar heb ik niks aan" "hier heb ik dan al minder aan die stukken omdat ik toch met m'n eigen verhaal moet eh moet komen"	*Adapted from* Langer (1986)

Table D.3
Activities or Decisions Related to the Subprocess of Composing

Category	Definition	Examples	Source
Composing	Units in which the participant composes his advisory paper		

Table D.3 (Continued)

Category	Definition	Examples	Source
Verbalizing composing	Units in which the participant is saying literally or paraphrases what he has written		
Reflecting on composition content	Units in which the participant assesses the value of what he has composed in terms of relevance or correctness	"dit schrap ik even weg want dat staat er al daar eigenlijk" "ik heb nu het idee dat dit niet helemaal eh de vraag beantwoordt maar de motivatie van statenleden en groen links is misschien ook niet helemaal eh zoals tie geconcretiseerd is in deze vraag"	*Adapted from* Langer (1986)

Table D.4
Activities or Decisions Related to Note Taking

Category	Definition	Examples	Source
Planning of note taking	Units in which the participant announces that he is going to take notes and/or he provides reasons for doing so	"dat er ook weer even in plakken" "dan maak ik even hier ook nog een aantekening eh"	
Note-taking	Units in which the participant is writing notes, copying & pasting passages, or selecting & highlighting passages		
Verbalizing note-taking	Units in which the reader is expressing literally or paraphrases what s/he is writing in his notes		
Re-reading notes	Units in which the participant rereads the notes		
Reflecting on content of notes	Units in which the reader evaluates the content of the notes	"nou is 't iets prettiger leesbaar"	
Evaluating the tools	Units in which the participant reflects on the usability or usefulness of the note-taking tool	"wat ik nu mis eigenlijk is een leeg velletje waar op je je eigen kreten kunt neerzetten"	

Table D.5
Other Communication Units

Category	Definition	Examples	Source
Comments on the task environment	Units in which the reader comments on the usability of the laptop, or the task environment (i.e. website with sources and advice window)	"plus dat ik door al dit gedoe maar een heel klein schermpje heb om m'n tekst in te typen" "ik moet ook even wennen aan dit toetsenbord"	
Comments on the experimental situation	Units in which the reader reflects on his position as participant or the situation he is in at that moment	"je mag hem wat mij betreft wel openlaten omdat het hier erg warm is"	
Navigation	Units that describe a movement from one document to the other or a switch from the website to the advice window		
Uncodable/ Inaudible	Units that cannot be classified according to the other categories or which could not be understood during transcription		

Appendix Advisory Papers

E

In this appendix we will display the advisory papers written by the twelve participants whose processes were analysed in detail.

Participant 1 (Marker Condition, with Stock Issues)

De Vijfde Nota wil de ruimtevraag oplossen door ruimtegebruik te intensiveren. Ten opzichte van de huidige situatie draagt het beleid uit de Vijfde Nota bij aan extra natuur door realisatie van de EHS, een sterke vermindering van wateroverlast, een iets betere bescherming van intrekgebieden voor drinkwater en een betere werking van de woningmarkt.
De restrictieve functies milieu, natuur en open ruimte/landschap worden planologisch beschermd binnen de door de provincies aan te geven groene contouren. De tussenliggende gebieden zijn balansgebieden. Daarin bevindt zich een groot aantal gebieden met landschappelijke waarden. De balansgebieden vormen tevens de zoekruimte voor toekomstige uitbreiding van de rode contouren.
De Vijfde Nota stelt zich ten doel de ruimtelijke diversiteit en identiteit, die bestaat in de vorm van contrasten tussen zowel open en besloten landschappen als tussen drukke en stille gebieden, te behouden en te versterken. Ook streeft de Vijfde Nota er naar cultuurhistorische en archeologische waarden en grootschalige open ruimten te beschermen.

Scenario
De Vijfde Nota Ruimtelijke Ordening schetst een scenario, waarin er in de komende 30 jaar zo'n 160.000 ha wonen, werken en verkeer bijkomt.

Consequenties ten aanzien van EHS
De consequenties van bovenstaand scenario zijn ongunstig voor de EHS.
Analyse van het Milieu- en Natuurplanbureau (MNP) geeft aan dat er moet worden geconstateerd dat de woningen die in het gebied van de bruto-EHS zijn verrezen, zich in de directe omgeving van de begrensde natuur bevinden. De Natuurbalans 2002 gaf al aan dat de begrensde EHS een versnipperd beeld oplevert. Na concrete begrenzing vertoont tweederde van de EHS een matige of onvoldoende ruimtelijke samenhang (MNP, 2002). De bouwactiviteiten in het gebied dat is aangeduid als de 'bruto-EHS' houden daarom het risico in dat het gebrek aan ruimtelijke samenhang wordt versterkt, en dat de landschappelijke eenheid van de begrensde natuur in de omgeving verloren gaat.

Maatregelen om beleidsdoelen te realiseren

Extra woningbouw niet in de directe omgeving van de begrensde natuur. Groene contouren duidelijk in beeld houden. Bij het selecteren van uitbreidingsgebieden rekening houden met bestaande natuur. Balansgebieden in Drenthe zorgvuldig bekijken op mogelijke inpassing woningbouw.

Gevolgen maatregelen voor de natuurkwaliteit
Door het uitvoeren van bovengenoemd scenario worden de risico's voor de ruimtelijke samenhang versterkt en de landschappeljke eenheid van de begrensde natuur dreigt verloren te gaan.
Deze gevolgen kunnen zoveel mogelijk worden beperkt door bovengenoemde maatregelen in te passen in de plannen.
Dus bij de uitbreiding erg zorgvuldig kijken naar de lokaties en de groene contouren.

Participant 4 (Marker Condition without Stock Issues)

Inleiding

Wat is de EHS?
De Ecologische Hoofdstructuur (EHS) is het belangrijkste onderdeel van het natuurbeleid. Het doel van de EHS is een aangesloten netwerk van kwalitatief hoogwaardige natuurgebieden. Eén van de bedreigingen voor het voortbestaan van planten en dieren is de versnippering van het geschikte biotoop. Versnippering kan met name bij soorten die afhankelijk zijn van grote aaneengesloten gebieden en bij soorten met een geringe verspreidingsmogelijkheid van grote invloed zijn. Heide en moerassen zijn in Nederland steeds meer versnipperd geraakt. Naast de verdeling over grote en kleine gebieden speelt ook de afstand tussen de gebieden en de barrières tussen de gebieden een rol. Eén van de barrières voor veel soorten is het dichte wegennet in Nederland, gekoppeld aan een toenemende verkeersintensiteit. Het verkeer heeft ook een directe invloed op dieren omdat er in het verkeer veel slachtoffers vallen, zoals de das. Het beleid is erop gericht de versnippering terug te dringen. Belangrijke instrumenten zijn de vorming van de ecologische hoofdstructuur (EHS) met aaneengesloten gebieden en verbindingszones en de aanleg van allerlei faunapassages bij wegen.

huidige beleid ten aanzien van de EHS
De provincies richten deze gebieden in, aangegeven in de groene contouren van de VIJNO. Hierin zijn gebieden begrensd waarin de natuur ontwikkeld moet worden, de zogenaamde groene gebieden.Hierbij gaat het zowel om bestaande natuurgebieden als om nieuwe natuurgebieden.

In de provincie Utrecht zijn de volgende gebieden aangewezen als EHSgebieden:
Utrecht Kromme Rijngebied (Natuurgebiedsplan)
Vecht- en Plassengebied (Natuurgebiedsplan)
Gelderse vallei (Natuurgebiedsplan)
Uiterwaarden Nederrijn en Lek (Natuurgebiedsplan)
De Venen (Natuurgebiedsplan)
Eemland (Natuurgebiedsplan)
Zuidwest Utrecht (Natuurgebiedsplan)
Utrechtse Heuvelrug (Natuurgebiedsplan)
Vianen (ontwerpfase) (Natuurgebiedsplan)

Realisatie huidige beleidsdoelstellingen Nederland
Om de EHS te realiseren wordt grond aangekocht, ingericht en overgedragen aan terreinbeheerders. Daarnaast worden voor de EHS beheersovereenkomsten afgesloten over gronden die niet worden verworven. De oorspronkelijke grondverwervingstaakstelling voor 'nieuwe natuur' komt uit het Natuurbeleidsplan van 1990 en betreft 151.500 hectare. 'Nieuwe natuur' omvat zowel reservaatgebieden als natuurontwikkelingsgebieden. Daarvan zal 19.200 hectare niet via verwerving, maar via particulier natuurbeheer worden gerealiseerd.

Met 'bestaand natuurterrein' zijn de 36.000 hectare van de zogenaamde afrondingsaankopen van natuurgebieden bedoeld. De taakstelling daarvoor komt uit de Relatienota van 1975.

Verder is er een recente taakstelling van 36.500 - 42.500 hectare voor robuuste en ecologische verbindingszones. Het doel hiervan is de vergroting van de ecologische samenhang van de EHS. Ook de 'kwaliteitsimpuls landschap' is een nieuw plan, dat mikt op zowel verbetering van de ecologische als de recreatieve kwaliteit van het landelijk gebied. Het is de bedoeling om 400.000 hectare cultuurlandschap op te knappen door aanleg en herstel van landschapselementen (de groen-blauwe dooradering) in 40.000 hectare.

De taakstelling van 'bos, landschap en recreatie' komt uit het Structuurschema Groene Ruimte (SGR) van 1995, net als de Randstadgroenstructuur. Daarbij gaat het deels om recreatief groen. Recent zijn er extra taakstellingen voor overig groen rond steden bijgekomen.

Realisatie Utrecht
Gemiddeld hebben de provincies bijna 50% van de taakstelling voor grondverwerving voor nieuwe natuur uitgevoerd. De verschillen in voortgang zijn echter groot.

[grafiek Provinciale grondverwerving, laat verschillen tussen gemeenten zien]

In deze figuur is voortgang van de verschillende provincies voor het verwerven van de EHS gronden aangegeven. Gemiddeld hebben de provincies ongeveer 50% van de taakstellingen uitgevoerd. Utrecht loop hier echter nog bij achter; minder dan 50% is verworven. Wel is een groot deel van de EHS gebieden al begrenst. Deze moeten dus nog verworven worden.

Kosten Realisatie voor Provincie Utrecht
Utrecht moet in totaal ongeveer 10 ha groen gebied inrichten in 2018 om de doelen voor de EHS te halen. Op zit moment is zo'n 4 ha verworven. De overige 6 ha zijn grotendeels begrensd, maar moeten nog aangekocht worden. De kosten voor deze grond is ongeveer 40.000 euro per ha. Dit zal de provincie dus zo'n 240.000 euro in de komende 14 jaar kosten. Mits de grondprijzen niet zullen stijgen.

Naast de aanschaf moet het gebied ook onderhouden worden, deze zijn hier niet in meegenomen.

Wat is de VIJNO?
De Vijfde Nota beoogt zo optimaal mogelijk aan de kwantitatieve ruimtebehoefte van de verschillende maatschappelijke functies tegemoet te komen. Daarbij wordt binnen de beperkte Nederlandse ruimte gezocht naar een ruimtelijke hoofdstructuur, die het totaal aan kwaliteiten van zowel wonen, werken en infrastructuur (bereikbaarheid) als van milieu, natuur en landschap zo groot mogelijk maakt.

De Vijfde Nota wil de ruimtevraag oplossen door ruimtegebruik te intensiveren en combineren, en door stedelijk en landelijk gebied te transformeren (de zogenaamde interventiestrategieën). De Vijfde Nota beoogt richting te geven aan de ruimtelijke hoofdstructuur met criteria voor ruimtelijke kwaliteit, toegepast in drie ruimtelijke beleidsconcepten: het contourenbeleid, stedelijke netwerken en water als ordenend principe.

gevolgen VIJNO voor de natuurkwaliteit

De EHS, de EU Vogelrichtlijn- en de Habitatrichtlijngebieden worden in de Vijfde Nota volledig opgenomen in de groene contour. De natuurkwaliteit kan worden verhoogd door meer oppervlakte natuur en de realisatie van grotere eenheden natuur. Met gebruik van een even groot areaal is de kans dat bepaalde diersoorten in een gebied voorkomen bij een aaneengesloten gebied aanzienlijk groter dan bij versnipperde gebieden. De in de Vijfde Nota na te streven natuurkwaliteit is daarmee afhankelijk van de schaal waarop door de provincies aan de ruimte bestemming wordt gegeven.

De globale zoekgebieden voor groene contouren in de Vijfde Nota suggereren dat er grote stukken aaneengesloten natuur zullen ontstaan. De concrete begrenzing van de EHS op regionale en lokale schaal resulteert tot nu toe, nadat circa 85% is begrensd, echter in een meer versnipperd beeld. De effectiviteit van het EHS-beleid blijft daarmee beperkt. De Vijfde Nota geeft vooralsnog niet aan hoe deze versnippering kan worden tegengegaan met het groene contourenbeleid. De tussenliggende, niet in de EHS opgenomen gebieden, zouden wel alsnog als natuurontwikkelingsgebied of als beheerslandbouw onder de groene contour gebracht kunnen worden.

De VIJNO kan kansen bieden wat betreft de natuurkwaliteit. Door op een slimme manier grond te verwerven kan de provincie tegen redelijke kosten de EHS inrichten. Een belangrijk punt van aandacht is hierbij het tegengaan van de versnippering. Dus eerst een plan maken waar de gond verwerfd zal worden voordat tot aankoop overgegaan wordt.

welke maatregelen genomen kunnen worden om de realisatie van deze beleidsdoelstellingen te bevorderen

De EHS kan tegen een redelijke prijs gerealiseerd worden. Op de Utrechtse Heuvelrug worden bijvoorbeeld projecten gestart waarbij de groene en rode functies van het gebied samengevoegd worden.

Op de Heuvelrug bevinden zich veel zorginstellingen, een groot militair terrein en enkele campings. Bij deze vormen van ruimtegebruik is de kans groot dat ze binnen enkele jaren veranderen en intensivering van het ruimtegebruik plaatsvindt. De provincie Utrecht heeft daarom het initiatief genomen voor een bestuurlijk platform 'Hart van de Heuvelrug'. In dit platform willen alle betrokken overheden een ontwikkelingsvisie voor het centrale deel van de Heuvelrug opstellen. Op den duur zouden zich daar ook overige actoren bij moeten aansluiten. De verschillende belangen moeten daarbij op een lijn worden gebracht: van het willen scheppen van ecologische verbindingen tot het

aanwijzen van nieuwe woningbouwlocaties, van het creëren van groene functies door ontwikkelingsplanologie tot het optimaliseren van de opbrengsten van grondverkopen.

Omdat geen van de overheden geld beschikbaar wil stellen om rode functies op de Heuvelrug te saneren, zoekt men naar alternatieve financieringsbronnen. De sloop van bebouwing op kwetsbare plaatsen op de Heuvelrug wil men financieren uit een verdere ontwikkeling van reeds aanwezige rode functies op andere plaatsen op de Heuvelrug die geen deel uitmaken van de ecologische hoofdstructuur. Per saldo zou de omvang van het rood op de Heuvelrug moeten afnemen.

Op meerdere gebieden zou de Provincie Utrecht verschillende functies van het gebied kunnen bundelen. Zo is ook te denken aan aanleg van groen voor recreatie. Met name in de Zuid-Oost hoek van Utrecht zijn de bewoners niet tevreden over de hoeveelheid bos in de buurt. Gemiddeld bezoekt zo'n 40% van de bevolking regelmatig bos- natuur en recreatieterreinen. Hier kan de provincie dus een slag slaan. In het oosten en zuid-oosten van de provincie liggen verschillende gebieden die aangewezen kunnen worden als EHS gronden. Wanneer deze ingericht kunnen worden als recreatiegebied, bijvoorbeeld met wandel- en fietsroutes kan de provincie deze gebieden verpachten of zelf exploiteren.
De aanschafkosten van in totaal zo'n 240.000 euro zijn hiermee mogelijk iets omlaag te brengen. De echte winst kan dan liggen in de onderhoudskosten. Deze kunnen door middel van betaalde recreatie of door het inrichten van enkele groene woonlocaties gedekt worden.

Participant 5 (Marker Condition with Stock Issues)

Beschrijving huidige situatie m.b.t. de EHS.

In de periode 1990-2000 is de nieuwbouw t.o.v. de periode 1980-1990 sterk toegenomen in de regio begrensde EHS met name in de provinces NH en Flevoland.
De huidige toelatingsplanologie blijkt positief te werken, het verdient dus aanbeveling deze planalogie te blijven gebruiken en niet teveel de vrije hand te verlenen aan gemeenten en provincies.

Hoofdlijnenakkoord huidig kabinet

De overheid gaat weliswaar meer geld in natuur spenderen maar er is minder sturing dus het is niet gezegd dat er geen huizen in de EHS zullen worden gebouwd.
http://localhost/ExpJeroen/top.php#

Verschillen en overeenkomsten

Het lijkt dus van belang in de gaten te houden wat procincies van plan zijn met hun woningnieuwbouwplannen in de buurt van de EHS.

Aandachtspunten

Het verdient aanbeveling om de waardevolle landschappen in de groene contouren op te nemen teneinde de EHS te versterken.
Gegeven het feit dat 80% van de waardevolle landschappen buiten de groene contour is opgenomen verdient het aanbeveling om deze zoveel mogelijk daarin onder te brengen.
Daarnaast lijkt het verstandig die groene contouren te laten samenvallen met de EHS.

Advies
De natuurkwaliteit neemt in het algemeen toe bij grotere aaneengesloten gebieden, versnippering dient dus te worden tegengegaan.
Dan is dus samenwerking tussen aanliggen gemeenten en ook provincies belangrijk!
We zijn van mening dat er bij de gemeenten en provincies teveel speelruimte bestaat bij het vaststellen van de begrenzing van de \"rode controuren\", dat is dus de bebouwing. Nadere regelgeving lijkt dus gewenst.
Er dient aandacht besteed te worden aan de aangrenzende gebieden van de EHS, daar zou men biologische landbouw moeten bevorderen i.t.t. de gangbare intensive veehouderij
. Deze laatste niet vestigen in de onmiddelijke nabijheid van de EHS.

Een ander aspect wat aandacht blijft verdienen is de milieudruk en dan vooral de CO2 uitstoot. Dit kan eigenlijk het

best in internationaal verband worden aangepakt.
Hetzelfde geldt voor de uitstoot van NOx, SO2, VOS.

Participant 7 (Notepad Condition without Stock Issues)

Aanleiding

De groene Statenfractie heeft vragen gesteld over de realisering van het EHS-beleid in relatie tot het VIJNO-beleid van 160.000 ha voor rode functies (zie bijlage gestelde vragen.
In deze notitie wordt ingegaan op:
- het bestaande EHS-beleid
- de gevolgen van de ruimtebehoefte (160.000 ha) voor rode functies voor dit beleid
- welke maatregtel getroffen kunnen worden om het EHS-beleid te realiseren en de gevolgen voor onze provincie
- de geschatte effecten voor de natuurkwaliteit.

Bestaande EHS-beleid

Zoals bekend is het rijksbeleid gericht op realisering van de EHS in 2018. In dat kader zijn de volgende punten van belang:
- In Fryslân hebben we de EHS nagenoeg volledig begrensd. Qua aankoop en inrichting van de gronden voor de EHS liggen we landelijk gezien aardig op schema.
- Het huidige kabinet heeft (landelijk) 700 miljoen euro extra beschikbaar gesteld voor de realisering van de EHS (+ de reconstructie).
- De inspanningen om de vereiste milieukwaliteiten voor de EHS te realiseren worden door het kabinet op een iets lager pitje gezet. Er komt o.m. een versoepeling van de ammoniak-regelgeving.
- geconstatreerd`kan worden (vooral naar aanleiding van EU-regtelgeving) dat de bescherming van de natuur tegen 'rode' functies steeds meer wordt aangetrokken.
- De laatste tijd komen de effecten van de klimaatsveranderingen voor de natuur steeds helderder naar voren. Met name wordt gewezen op de noodzaak van een snelle en samenhangende realisering van de EHS.

Ruimtebehoefte 160.000 ha voor rode functies

In de VIJNO is aangegeven dat de komende jaren landelijk 160.000 ha nodig is voor de uitbreiding van rode functies (gebieden voor wonen, werken en infrastructuur).
In de VIJNO is met name door het vastleggen van de zogenaamde groene en rode contouren verzekerd dat de realisering van de EHS en de \instandhouding en versterking van natuurkwaliteiten geen gevaar loopt. Ook de bescherming van de EHS is in het rijksbeleid (SGR2) en het EU-beleid (VHR-gebieden) in principe goed`geregeld. Van groot belng is in dit kader dat de provincie serieus de rode en groene contouren op kaart zetten en dat provincie en gemeenten het EHS-beschermingsregime goed toepast. Daarnaast is belangrijk dat de gemeenten hun bewstemmingsplannen op orde hebben (d.w.z. daarin de EHS-natuur adequaat hebben geregeld).

Opgemerkt moet worden dat de ruimtebehoefte aan nieuwe rode functies zich in de verstedelijkte delen van ons land veel meer voordoen dan in onze provincie. De 'bedreiging' van de EHS is in Fryslân uit dit oogpunt dus realitief beperkt.

Noodzakelijke maatregelen om de afgesproken EHS te realiseren

In de planologische sfeer is van belang:
- dat we als provincie voortvarend de rode en groene contouren aan gaan geven
- het EHS-beschermingsregime serieus verwerken in ons nieuwe Streekplan en de gemeenten stimuleren hun bestemmingsplannen buitengebied up to date te maken.

Van veel groter belang voor het realiseren van de EHS-doelen is de uitvoering ervan binnen de afgesproken periode tot 2018. Dit betekent dat voldoende rijksmiddelen beschikbaar moeten zijn, niet alleen voor de strikte aankoop en inrichting van de EHS-gronden maar ook voor begeleidende maatregelen in de sfeer van landinrichting. De 700

miljoen extra die dit Kabinet beschikbaar stelt is wel een steun in de rug hiervoor, maar landelijk wordt ingeschat dat dit nog ontoereikend is.

Daarnaast is, mede vanwege de gevolgen van de klimaatsveranderingen, verbetering van de milieukwaliteiten essentieel voor de realisering van de EHS-doelstellingen. Het gaat hier bijvoorbeeld om vermindering van de verdroging, terugdringen van emmissies en het treffen van effectgerichte maatregelen. Dit speelt ook voor de Friese EHS. Recente rapporten van het RIVM laten zien dat hewt rijk de komende jaren voor dergelijke maatregelen onvoldoende middelen beschikbaar stelt.

Geschatte effecten natuurkwaliteit

Hiervoor is aangegeven dat in Fryslân niet zozeer de bedreiging voor de EHS speelt vanuit de ruimtebehoefte van 160.000 ha voor de 'rode'functies. Hiervoor is wel nodig dat we op een afgewogen wijze spoedig de rode en groene contouren vastleggen, het bestaande EHS-beschermingsregime goed toepassen en dat de gemeenten hun bestemmingsplannen op orde hebben.

De milieu-omstandigheden zijn van veel groter belang voor het realiseren van het EHS-beleid en het bereiken van de gewenste natuurkwaliteiten. Voorgesteld wordt op korte termijn een globale inventarisatie uit te voeren welke milieumaatregelen met name voor de Friese EHS getroffen mnoeten worden en een inschatting te maken hoeveel dit gaat kosten en hoe dit is te financieren.
Daarnaast wordt het belang van een goede samenhangende EHS-structuur steeds duidelijker. Voorgesteld wordt via een quick-scan te bekijken of de huidige begrenzingen hieraan voldoen en indicaties te verkrijgen of misschien hier en daar de samehang versterkt kan worden (bijvoorbeeld door meer in te zetten op ecologische verbindingen en wellicht enkele herbegrenzingen). Voorzover mogelijk moet hierbij ook de klimaatsveranderingen bij betrokken worden. Interessant is daarbij met name of we de in onze Nota Natuurbeheer vastgeslegde natuurdoelen kunnen bereiken.

Participant 8 (Notepad Condition with Stock Issues)

Inleiding.
Enkele leden van een groene partij in Provinciale Staten hebben u vragen gesteld over de consequenties van dit scenario voor de Ecologische Hoofdstructuur (EHS). Ze willen weten welke maatergelen het Rijk zou kunnen nemen om de EHS te beschermen danwel uit te breiden. Tevens willen ze weten welke consequenties deze maatregelen hebben voor uw provincie.

Probleemstelling.
Volgens het huidige rijksbeleid zijn voldoende maatregelen gecreeerd om de beoogde realisatie van de EHS tot stand te brengen tijdens deze kabinetsperiode. Het kabinet heeft voorkeur voor particulier natuurbeheer maar het heeft daarnaast landelijk 700 miljoen euro beschikbaar gesteld voor grondverwerving.
De provincie Drenthe daarentegen houdt vast aan het principe van grondverwerving ten behoeve van de natuurbeheersorganizaties SBB, NM en HDL omdat daarmee de bestemming van de verworven gronden een meer definitief karakter heeft dan d.m.v. particulier natuur beheer (na afloop van de beheersovereenkomsten kunnen de gronden immers weer vrijvallen voor tradioneel grondgebruik als bijv. grootschalige niet ecologische teelten; er is dan per saldo niets gewonnen aan de realisatie van de EHS).
Zoals u in de provinciale begroting kunt zien, heeft de provincie hiervoor zelf ook gelden beschikbaar gesteld.
Enkele jaren geleden hebben de provincies met het rijk een bestuursakkoord gesloten waarbij is bepaald dat in 2018 de Gezien de uitgangspunten van Balkenende 2 zal dit niet kunnen worden gehaald.

Niettemin zal door met name de provinciale inzet van middelen de schade aan voortgang beperkt blijven en zal volgens de huidige werkwijze de EHS in Drenthe rond 2025 gerealiseerd kunnen zijn.

Uiteraard zou het Rijk meer maatregelen kunnen nemen (bijvoorbeeld bij \"rood\"voor \"groen\")en een verplichte compensatieregeling kunnen invoeren maar daarvoor is landelijk te weinig politiek draagvlak.

Doordat niet helemaal duidelijk is in welke mate de milieuverdragen zullen worden nageleefd en geinterpreteerd zijn niet alle consequenties voor de bescherming van de natuur te overzien.

Advies.

Uw college deelt de zorgen van de groene fractie grotendeels en het college zal zich inspannen om de realisatie van de EHS zo spoedig mogelijk te laten plaatshebben.
In provinciaal opzicht zal evenwel het huidige beleid worden gecontinueerd mits het politiek draagvlak in provinciale staten daarvoor tijdens de huidige bestuursperiode aanwezig blijft.
Resumerend houdt dit in:
- met het Rijk in IPO-verband in onderhandeling blijven om de oorspronkelijke afspraken af te dwingen (EHS in 2018 gerealiseerd);
- naast de rijksmiddelen in de provinciale begroting middelen blijven fourneren om de realisatie van de EHS zoveel mogelijk toch in 2018 te doen plaatshebben althans in Drenthe;
- met het rijk in IPO-verband in onderhandeling te gaan om een landelijke compensatieregeling in het leven te roepen;
- het ingezette provinciale en gemeentelijke compensatiebeleid nader vorm te geven.

Participant 10
Advies aan gedeputeerde n.a.v. vragen uit PS gesteld door de Groenen:

vr 1. Consequenties van scenario 5e nota (160.000 ha. voor wonen,werken en verkeer) voor de Ecologische Hoofdstructuur (EHS).

vr 2. welke maatergelen zou het Rijk kunnen nemen om de EHS te beschermen danwel uit te breiden

vr. 3 welke consequenties deze maatregelen hebben voor uw provincie

Huidig beleid mbt. EHS in Overijssel.
EHS begrenzing is op rijksniveau uitgewerkt in Natuurbeleidsplan. Deze is voor onze provincie nader uitgewerkt in de 7 natuurgebiedsplannen.

Hierin is onderscheidt gemaakt tussen natuurdoeltypen die via particulier beheer kunnen `worden`gerealiseerd en natuurdoeltypen waarvoor verwerving en doorlevering naar NB-organizaties gewenst is.

SvZ `Verwerving 2001
In Overijssel moet ca 16.300 hectare grond tbv nieuwe natuur worden verworven. Hiervan was eind 2001 ruim 14000 hectare begrenst en ruim 6000 hectare verworven.

SvZ Beheersovereenkomsten
EInd 2001 was 50% van het als agrarisch beheer begrenste oppervlak omgezet in beheersovereenkomsten.

Beleidsontwikkeling

1. Hoofdlijnenakkoord Balkenende 2
Het kabinet Balkenende-2 reserveert in de periode 2004-2007 700 miljoen euro extra voor natuur en reconstructie, waarvan ruim 400 miljoen voor de realisatie van de Ecologische Hoofdstructuur (EHS). Daarmee is voldoende geld beschikbaar om het voor de komende kabinetsperiode beoogde areaal EHS te realiseren.

2. 5e nota RO
Hierin worden de door het Rijk gewenste ruimtelijke ontwikkelingen voor de komende 20 jaar aangegeven.
Hierin is sprake van`160.000 ha extra claim voor wonen, werken en verkeer.

Gevolgen voor provinciale EHS.
Door deze extra ruimteclaim komt er meer druk op de realisatiemogelijkheden van de EHS.

Mogelijke negatieve effecten.

1. Grondprijzen
Door de extra vrag naar grond zal de prijs van landbouwgrond sterk stijgen. Met name in de nabijheid van stedelijk gebied.
Dit leidt ertoe dat de thans beschikbare middelen onvoldoende zijn om de EHS in Overijssel te realiseren.

Rijk hierop wijzen. Extra geld claimen.

2. Verstoring/versnippering

Door de extra oppervlakte w&W&V zal de verstoring en versnippering van de EHS toenemen.`
Dit zal ertoe moeten leiden dat de huidige begrenzing opnieuw worden bezien`en in samenhang met de nieuwe inrichtinsvoostellen worden uitgebreid.
Hiervoor is extra ruimte nodig danwel met een herschikking plaatsvinden van de huidige hectares.
daarnaast moet op nationaal en internationaal niveau generiek beleid mbt deposities ed worden opgesteld.

Oplossingsrichtingen
Zowel de oplopende grondprijzen als de bedreiging door verstoring/versnippering vraagt dus om een robuust groen/blauw casco waarbij zoveel mogelijk moet worden gezocht naar functiecombinaties b.v. landbouw/natuur, landbouw/water, water/natuur.

Een mogelijke maatregel is het instellen van rode contouren rond stedelijk gebied, aangevuld met een goed handhavingskader.Daarnaast moeten de contouren stevig worden vastgelegd in Streekplan en bestemmingsplannen. Een goede zonering is hiervoor vereist.

Bij nieuwe ontwikkeling in aldus bestemde ruimte moeten strenge voorwaarden worden opgesteld voor evt. inpassing van WWV-functie

Door middel van ontwikkelingsplanologie kan i.s.m. andere belangen een optimale invulling worden gemaakt van de beperkt beschikbare ruimte.
Dit biedt tevens mogelijkheden om andere functies mee te laten betalen voor de natuur (rood-voor-groen.
Dit is enigszins conflicterend met het contourenbeleid, wat de vrijheid tot het maken van ontwikkelingsplannen beperkt..

In de stedelijke gebieden moet dit met voorrang worden uitgewerkt.

Wat is nodig van het rijk?
1. Het zoeken naar functiecombinaties vraagt om beleidsruimte. De regelgeving zal op dit vlak moeten worden verruimd.

2. Stel bij rijk voor om met een voorbeeldgebied te starten, bijv. in het gebied Zwolle-Kampen of Stedenband Twente.

3. Kondig aan dat stijgende prijzen extra verwervingsbudget zullen vragen in de toekomst.

Participant 11 (Notepad Condition without Stock Issues)

Vraagstelling
Enkele leden van een groene partij in Provinciale Staten hebben vragen gesteld over de consequenties van dit scenario voor de Ecologische Hoofdstructuur (EHS). Ze willen weten welke maatregelen het Rijk zou kunnen nemen om de EHS te beschermen danwel uit te breiden. Tvens willen ze weten welke consequenties deze maatregelen hebben voor uw provincie.

Inleiding
Op basis van een vraag van de leden van de Groene Partij wordt in dit advies een voorstel gedaan voor de opstelling die de provincie zou kunnen kiezen in de beleidsinspanningen die zij wil leveren op het terrein van de Ecologische Hoofdstructuur.
Allereerst aandacht voor de maatregelen die er op Rijksniveau genomen kunnen worden en vervolgens wat een en ander voor de provincie betekent.

Rol provincies

De Ecologische Hoofdstructuur (EHS) is het belangrijkste onderdeel van het natuurbeleid. Het doel van de EHS is een aangesloten netwerk van kwalitatief hoogwaardige natuurgebieden. De provincies geven via gebiedsplannen aan welke gebieden precies de EHS vormen; dat levert de netto EHS op. Bij de begrenzing gaat het zowel om bestaande natuurgebieden als om nieuwe natuurgebieden.

Toestand
Elke provincie heeft een taakstelling voor het verwerven van grond voor nieuwe natuur. In Zeeland is reeds 78% van de taakstelling uitgevoerd; het overige deel is al wel begrensd, dat wil zeggen dat is aangegeven welke gronden nog moeten worden verworven. In Limburg, Noord-Brabant, Utrecht en Overijssel is minder dan 50% van de grond verworven. In de meeste provincies is ook de begrenzing nog niet afgerond.

Beleidsdoelen
De nota 'Natuur voor mensen, mensen voor natuur' stelt als doel dat de Ecologische Hoofdstructuur (EHS) in 2018 volledig is gerealiseerd. Eén van de taakstellingen daarbij is om 151.500 hectare aan nieuwe natuur te realiseren: 132.300 hectare moet worden verworven en voor 19.200 hectare moeten beheerovereenkomsten afgesloten met particuliere natuurbeheerders, in plaats van de gronden te verwerven. Deze landelijke taakstelling is verdeeld over de provincies via afspraken tussen het Ministerie van LNV en het Interprovinciaal Overleg (IPO).

Maatregelen van het Rijk

Het rijk hecht belang aan het uitbreiden van de EHS door extra gelden de komende jaren beschikbaar te stellen voor de uiteindelijke realisatie van de EHS in 2018.
In de periode 2004-2007 investeert het huidige kabinet ruim 400 miljoen extra in de EHS. Daarnaast zet het kabinet sterk in op particulier natuurbeheer waarmee de jaarlijkse kosten in de kabinetsperiode naar beneden gaan, maar wel 30 jaar lang op de begroting zullen blijven drukken. Deze twee ontwikkelingen hebben tot gevolg dat in deze kabinetsperiode voldoende geld is gereserveerd om aan de nieuwe areaal-taakstellingen te voldoen. Echter, in 2004 nog sprake van een beperkt budget omdat de extra EHS-gelden voor de periode 2005-2007 zijn begroot.

Hoogwaardige natuurkwaliteit EHS vereist zowel generiek beleid als ruimtelijk zoneringsbeleid.
Dit leidt tot de volgende drieslag:

1. Generiek beleid, bij voorkeur in internationaal verband, voor het laten afnemen van de achtergronddepositie.

2. Geen uitbreiding of nieuwvestiging in een zone langs gevoelige natuurgebieden omdat anders de depositie op deze natuurgebieden juist toeneemt (ruimtelijke zonering).

3. Selectief, bij natuurgebieden met hoge natuurwaarden en een hoge lokale ammoniakdepositie ('hot spots'), saneren van lokale bronnen.

Zones rond kwetsbare natuur vallen niet langer onder de Wet ammoniak en veehouderij. Daarmee blijft het mogelijk dat intensieve veehouderij uitbreidt of zich nieuw vestigt dichtbij kwetsbare natuurgebieden. Dit kan leiden tot een toename van de ammoniakdepositie op deze natuur, terwijl het beleid juist een reductie van de depositie beoogt. Van de circa 130.000 ha kwetsbare natuur waarvoor de zoneringsmaatregel niet meer geldt, is circa 40.000 aangemeld onder de Vogel- en/of Habitatrichtlijn. De bescherming van deze gebieden tegen de 'externe' werking van ammoniak is waarschijnlijk niet te realiseren zonder aanvullende ruimtelijke zoneringsmaatregelen, als aanvulling op het generieke ammoniakbeleid.

Realisatie EHS risicovol door verminderde sturing van het Rijk

De doelstelling van de EHS is drieledig, namelijk het realiseren van het areaal EHS, een samenhangende EHS met een hoogwaardige natuurkwaliteit. Door een aantal beleidswijzigingen, deels onder het vorige kabinet ingezet, neemt de sturing van de rijksoverheid op de realisatie van deze doelen af. Dit is risicovol voor het bereiken van de beoogde EHS. De risico's zijn:

- De belangstelling voor particulier natuurbeheer is tot nu toe erg klein, terwijl het kabinet juist inzet op grotere inzet van particulier beheer (figuur 1).

- Bij particulier beheer kan de overheid minder sturen op een samenhangende EHS.

- Het ruimtelijk beleid zoals verwoord in de Stellingnamebrief Nationaal Ruimtelijk Beleid (2002) biedt bescherming aan de nu aangewezen maar versnipperde natuurgebieden. Het biedt echter geen waarborg voor een samenhangende EHS.

- Het voornemen om de Wet ammoniak en veehouderij (2002) alleen van toepassing te laten zijn op de zeer kwetsbare natuur en niet meer op de kwetsbare natuur.

Konsekwenties maatregelen voor de provincie

De provincie dient in haar ruimtelijk zoneringsbeleid te voorkomen dat er uitbreidingen of nieuwvestiging in een zone langs gevoelige natuurgebieden plaatsvinden omdat anders de depositie op deze natuurgebieden juist toeneemt.
Bij natuurgebieden met hoge natuurwaarden en een hoge lokale ammoniakdepositie ('hot spots')dient de provincie aandacht te hebben voor het saneren van lokale bronnen.

De situatie voor wat betreft de gebiedsplannen in de provincie Overijssel is als volgt.
Noordwest-Overijssel (december 2001)Natuur/beheersgebiedsplan
Vecht-Regge wordt eind 2002 Natuur/beheersgebiedsplan
Noordoost-Twente december 2001 Natuur/beheersgebiedsplan
Zuidwest-Twente april 2002 Natuur/beheersgebiedsplan
Engbertsdijksvenen & Veenschap maart 2001 Natuur/beheersgebiedsplan
Salland februari 2002 Koepelplan reconstructie
IJsseldelta, Zwarte Water, Rouveen oktober 2002 Natuur/beheersgebiedsplan
De grondverwerving verloopt als volgt,gemiddeld hebben de provincies bijna 50% van de taakstelling voor grondverwerving voor nieuwe natuur uitgevoerd. De verschillen in voortgang zijn echter groot.
In Limburg, Noord-Brabant, Utrecht en Overijssel is minder dan 50% van de grond verworven. In de meeste provincies is ook de begrenzing nog niet afgerond.

Advies

In het bovenstaande is aangegeven wat in hoofdlijnen de rol van de provincie in het beleidsveld is, wat de stand van zaken is en welke ambitie het Rijk uitspreekt voor het behalen van de doelstellingen in 2018.
Om tot realisatie van de doelstellingen te komen is de sturende rol van het Rijk belangrijk, maar zij kiest ervoor minder sturend op te treden.
Ondanks dat er meer geld beschikbaar wordt gesteld, worden de condities waaronder het beleid moet worden uitgevoerd lastiger. Daar waar de provincie aan zet is kan er op onderdelen wel sturend door de provincie worden opgetreden, maar zijn door de ruime toetsingsnormen uit de Vijfde Nota de beleidsmatige vraagstukken complexer geworden, waardoor dat de snelheid van uitvoering weer vertraagd.

Het zou wellicht zinvol zijn om op provinciaal nivo de beleidsuitgangspunten helder en toetsbaar te formuleren waardoor er een versnelling in de uitvoering kan worden bereikt.
De gevolgen voor de natuurkwaliteit zullen dan positief zijn omdat de EHS doelstellingen dan gewaarborgd zullen blijven.

Participant 19 (Marker Condition without Stock Issues)

Conceptadvies 5E Nota Ruimte
De NR legt een aantal verschillende functies vast.
De NR is er ook voor bedoeld om de natuurfuncties te beschermen.
Door het aangeven van grenzen worden de verschillende functies beschermd. De EHS is hierop ook aangegeven. De intentie van het Rijk is om de EHS voor 2018 te realiseren. Wij heben vertrouwen in dit rijksbeleid. Voor de toekomst is onduidelijk of voor de hele periode voldoende middelen ter beschikking worden gesteld. We zullen de jaarlkijkse afspraken met het rijk daarvoor scherp in de gaten moeten houden.

We constateren wel dat er een verschil\is in definiering tussen Rijk en Provincie van de EHS . Dan gaat het met name om de EVZ's , op dit moment onvoldoende niet vastgelegs in NR. Daar lopen nog gesprekken over.
Daarnaast staat de hoeveelheid midderlne die het Rijk beschikbaar stelt niet in verhouding tot de ambities voor de EHS.

kader.....
provinciale beleid: tekst POP II :
 tEKST TOEVOEGEN
ehs verankerd in zonering POPII
beterft de onderdelen ; kerngebieden
natuurontw gebeiden etc

tekst NR :
DEFINIERING EHS
.....

conclusie:
provinciaal \beleid ligt in het verlengd van NR , op een aantal\ punten evrschillen en uitvoering van rijksbeleid onvoldioende veiligggesteld. Daarin zal jarlijks aandacht besteed moeten worden in de sturingsafspraken met het RIJK

Maatregelen:
RIJK :
voldoende middelen beschikbaar stellen voor het eraliseren van de EHS `zoalds nu in NR vastgelegd.
De positie van de EVZ's verduidelijken.
PROVINCIE :
afspraken met het rijk over inzet middelen veilig stellen in sturingsafspraken (Tanja)
op korte termijn : beleid t.a.v. EVZ verduidelijken (IPO/BO)
monitoren van vorderingen eigen provinciale EHS beleid
Strategie realiseriing EHS (afronding, inrichting, EVZ) optellen : kernwoorden : samenwerking, meeliften, werk \met werk

Toevoegen : 1. Polankaart NR
2 EHS kaart POP II

Participant 24 (Marker Condition without Stock Issues)

Geachte gedeputeerde,

Hierbij mijn conceptadvies:

In principe is de EHS via het streekplan en het rijksbeleid voldoende beschermd tegen planologische aantasting. De locatie van die 160.000 ha. zal dan ook voor een groot deel buiten de EHS liggen, en de provincie zal daar via de toetsing van bestemmingsplannen een bepalende rol in hebben.

De beste bescherming biedt uiteraard aankoop. Het kabinet Balkenende-2 reserveert in de periode 2004-2007 700 miljoen euro extra voor natuur en reconstructie, waarvan ruim 400 miljoen voor de realisatie van de Ecologische Hoofdstructuur (EHS). Daarmee is voldoende geld beschikbaar om het voor de komende kabinetsperiode beoogde areaal EHS te realiseren.Het kabinet zet echter sterk in op particulier natuurbeheer en de belangstelling daarvoor is tot nu toe erg klein.Door middel van voorfinanciering van aankopen kan de provincie zorgen dat de doelstellingen m.b.t. het areaal EHS toch gehaald worden.

Ondanks de planologische bescherming zijn in de EHS toch nogal wat woningen gebouwd. Hierbij moet echter onderscheid gemaakt worden tussen de bruto (rijks)-EHS en de door de provincies begrensde EHS. In de gebieden bestaande natuur 1990/ begrensde EHS zijn landelijk van 1980-1990 ongeveer 1500 woningen verrezen, en van 1990-2000 waren dat er 7500. Er is verspreid over het gehele land gebouwd, met vooral voor de periode 1990-2000 een duidelijke concentratie in Noord-Holland, Utrecht en Flevoland. In Noord-Brabant gaat het om ca. 500 gebouwen.

Verreweg het grootste deel van wat er in het gebied van de bruto-EHS is bijgebouwd, is dus buiten de bestaande natuur 1990/ begrensde EHS terechtgekomen. Bouwactiviteiten blijken vooral voor te komen in regio's onder stedelijke druk, en op plaatsen waar bestaand bebouwd gebied dicht tegen de natuur aanligt. Vaak hebben gemeenten verouderde bestemmingsplannen, waardoor deze bouwactiviteiten mogelijk zijn.

De provincie heeft een belangrijke taak in het toetsen van bestemmingsplannen en daarmee een bepalende factor voor het vrijwaren van de EHS van bebouwing.Ingesloten door de EHS komen veel rode functies voor die in de nabije toekomst aan verandering onderhevig zullen zijn: zorginstellingen en militaire complexen die leeg komen te staan, campings waar men recreatiewoningen wil bouwen. Ook zijn delen van de EHS sterk versnipperd door infrastructuur. Infrastructuur kan worden overbrugd met wildviaducten. Er bestaat echter nog geen landelijk beleid voor het saneren van ongewenste bestemmingen en het voorkomen van intensivering van het ruimtegebruik op deze locaties. Het rijk heeft hiervoor ook geen financiën beschikbaar gesteld. Hierin kan de provincie een belangrijke rol vervullen, zowel financieel als planologisch.

Het gaat echter niet alleen om het vrijwaren van de begrensde EHS zelf van bebouwing. Aangezien de begrensde EHS sterk versnipperd is, houden rode ontwikkelingen in de directe omgeving daarvan het risico in dat weliswaar de EHS wordt beschermd maar de landschappelijke samenhang met de omgeving verloren gaat. Via de bescherming van de provinciale GHS zal de provincie ook die samenhang bewaken.

Participant 27 (Notepad Condition with Stock Issues)

Aanleiding
Enkele leden van een groene partij in Provinciale Staten hebben uw Gedeputeerde vragen gesteld over de consequenties van dit scenario voor de Ecologische Hoofdstructuur (EHS). Ze willen weten welke maatergelen het Rijk zou kunnen nemen om de EHS te beschermen danwel uit te breiden. Tevens willen ze weten welke consequenties deze maatregelen hebben voor uw provincie.

Conceptadvies
1. Het huidige beleid ten aanzien van de EHS.

Doel van de Ecologische Hoofdstructuur (EHS) is het creeren van samenhangende natuurgebieden in Nederland. Daarvoor wordt uitgegaan van de bestaande natuurgebieden, waaraan een aantal te creeren natuurgebieden wordt toegevoegd. Samenhangende natuurgebieden van goede kwaliteit bieden aan zowel de blijvende, de doortrekkende als de nieuwe diersoorten de kans om te overleven en zo de biodiversiteit in Nederland in stand te houden.

De provincie kent de EHS. Bepaalt aan de hand daarvan hoe de groene contouren moeten lopen. Toetst de gemeentelijke bestemmingsplannen. En kan bestemmingsplannen afkeuren of wijzigen. In de afgelopen 10 jaar is er wel gebouwd in de EHS, maar dit is niet in Overijssel gebeurd. De provincie stimuleert het vertrek van rode activiteiten uit het groene gebied; Groen voor rood, dat wil zeggen ruimte-voor-ruimte. De provincie heeft een duidelijk en consistent uitgestippeld, waarin het juiste evenwicht bewaard wordt tussen ontwikkelingsruimte en randvoorwaarden. Een aardig voorbeeld biedt de ruimte-voor-ruimte-regeling, die de sloop van stallen beoogt, gefinancierd uit extra woningbouw in het landelijk gebied.

2. De consequenties zijn van het hierboven geschetste scenario voor de realisatie van de beleidsdoelstellingen.

In 1990 lanceerde de rijksoverheid de Ecologische Hoofdstructuur (EHS) in de regeringsbeslissing van het Natuurbeleidsplan. Het rijk heeft de EHS planologisch verankerd in het Structuurschema Groene Ruimte (SGR1, 1995). Dit geeft aan dat de EHS moet worden beschermd en ontwikkeld door een combinatie van planologische bescherming, aankoop van gronden en het afsluiten van beheersovereenkomsten met particuliere eigenaren en een goede kwaliteit van milieu en water.

Probleemstelling
De Vijfde Nota Ruimtelijke Ordening schetst een scenario, waarin er in de komende 30 jaar zo'n 160.000 ha wonen, werken en verkeer bijkomt. Wat zijn de consequenties voor de Ecologische hoofdstructuur?

Rollen gemeenten, provincies
Wonen, werken en verkeer worden zoveel mogelijk gebundeld en gecombineerd. De gemeenten schetsen de zogenaamde rode contouren; zij geven aan waar gewoond en gewerkt moet gaan worden. De provincie schetst groene contouren waarin de restrictieve functies milieu, natuur en open ruimte/landschap planologisch worden beschermd. De tussenliggende gebieden zijn balansgebieden. Daarin bevindt zich een groot aantal gebieden met landschappelijke waarden. De balansgebieden vormen tevens de zoekruimte voor toekomstige uitbreiding van de rode contouren; dit is de ruimte waar in de toekomst gebouwd kan worden.

De Vijfde Nota stelt een beleid voor waarbij de provincies een belangrijke rol spelen bij de bescherming van natuur en landschap. De ruimtelijke schaal waarop door de provincies invulling gegeven zal worden aan de restrictieve groene contour is namelijk sterk bepalend voor de uiteindelijk resulterende kwaliteit. Voor extra landschapsbescherming zijn provincies aangewezen op provinciale landschappen, die in de balansgebieden liggen en kwetsbaar kunnen zijn bij de in de toekomst door gemeenten vast te stellen rode contour, en de vijfjaarlijkse herijking daarvan. Zonder duidelijke criteria voor de begrenzing van de groene contour (zoals zeldzaamheid, internationale betekenis en kwetsbaarheid) en de aanwijzing en wettelijke bescherming van provinciale landschappen, zal het moeilijk zijn om tegendruk te bieden aan de economisch gedreven functies.

De provincie zal uiteindelijk een afweging moeten maken tussen het economische belang van rode functies, waarmee de realisering van EHS gefinancierd moet worden.

3. Welke maatregelen kunnen genomen worden om de realisatie van deze beleidsdoelstellingen te bevorderen.

Ecologische hoofdstructuur moet beschermd worden. De provincie heeft een aantal gebieden aangewezen als balansgebied. Rode functies worden zoveel mogelijk ondergebracht binnen de rode gebieden. Indien dit onmogelijk is, kan een balansgebied aangewezen worden als vestigingsplaats. Aangezien de status van de balansgebieden op den duur kan veranderen, wordt dit zoveel mogelijk vermeden.
Door het extra geld dat het Rijk voor de uitbreiding van de EHS beschikbaar stelt, kan gegarandeerd worden, dat rode functies uit de EHS kunnen verdwijnen.

4. De gevolgen van deze maatregelen voor de natuurkwaliteit.
Daardoor zal de natuurkwaliteit in de groene gebieden verbeteren en de EHS in Overijssel naar planning in 2018 gerealiseerd zijn.

Participant 38 (Marker Condition with Stock Issues)

Advies relatie EHS- 5e nota

Consequenties van 5e nota, bouw van 160.000 extra woningen tot 2034.

Huidig beleid t.a.v. EHS
Een belangrijk deel van het natuurbeleid is gericht op het realiseren van de Ecologische Hoofdstructuur (EHS), een aangesloten netwerk van kwalitatief hoogwaardige natuurgebieden. Daartoe worden gebieden verworven, ingericht, aan beherende instanties overgedragen en beschermd. De taakstelling voor nieuwe natuur in Zuid-Holland bedraagt circa 11.000 ha. Daarnaast is bescherming van de bestaande natuurterreinen een speerpunt van het EHS-beleid.

Gevolgen van de 5e nota
De Vijfde Nota beoogt zo optimaal mogelijk aan de kwantitatieve ruimtebehoefte van de verschillende maatschappelijke functies tegemoet te komen. Daarbij wordt binnen de beperkte Nederlandse ruimte gezocht naar een ruimtelijke hoofdstructuur, die het totaal aan kwaliteiten van zowel wonen, werken en infrastructuur (bereikbaarheid) als van milieu, natuur en landschap zo groot mogelijk maakt.
Als gevolg van de 5e nota zal de komende 30 jaar een opppervlakte van zo'n 160.000 ha van functie veranderen (wonen, werken, verkeer).
In het contourenbeleid onderscheidt de Vijfde Nota de zogenaamde 'rode' en 'groene' contouren. De actieve, primair economisch gedreven functies wonen, werken en infrastructuur moeten zich volgens de Vijfde Nota kunnen ontwikkelen binnen de door gemeenten aan te geven rode contouren. De restrictieve functies milieu, natuur en open ruimte/landschap worden planologisch beschermd binnen de door de provincies aan te geven groene contouren. De tussenliggende gebieden zijn balansgebieden.
De EHS, de EU Vogelrichtlijn- en de Habitatrichtlijngebieden worden in de Vijfde Nota volledig opgenomen in de groene contour

Kansen en bedreigingen voor realisatie EHS
Het RIVM heeft de gevolgen getoetst van de 5e nota voor o.a. de kwaliteit van het landelijk gebied. Uit de analyse blijkt dat de 5n ten opzichte van de huidige situatie bijdraagt aan extra natuur door realisatie van de EHS.
Daarnaast zijn er echter ook negatieve aspecten: de bescherming van landschapswaarden en de recreatiekwaliteit nemen af.
Mogelijke kansen bieden o.a. de ontwikkeling van de Deltametropool en ruimte vioor water
OVer de mogelijkheden van een combinatie van water met andere functies is het RIVM niet onverdeeld positef;\ in sommige gevallen is de natuurkwaliteit ondergeschik aan bv waterberging of afvoer
De beoogde bundeling van verstedelijking op de Randstadring biedt gunstige voorwaarden voor het verbeteren van de kwaliteiten van natuur en landschap in het Groene Hart en voor de planologische inpasbaarheid van de benodigde waterberging

Voorgestelde maatregelen
* De rode contouren kunnen kortom een nuttig instrument zijn om de in de Vijfde Nota beoogde ruimtelijke

diversiteit van stad en land niet verder af te laten nemen. De nadelen moeten echter in combinatie met ander instrumentarium worden opgevangen. Dit vraagt om maatwerk, al naar gelang de verschillende mogelijke uitwerkingen van de rode contour
*Planologische duidelijkheid is nodig om de druk op de grondprijzen in beoogde groengebieden te verminderen. Dit zou bereikt kunnen worden door de gebieden bestemd voor recreatief groen in en om de steden onder de groene contour te brengen.
* De tussenliggende, niet in de EHS opgenomen gebieden, zouden wel alsnog als natuurontwikkelingsgebied of als beheerslandbouw onder de groene contour gebracht kunnen worden

Gevolgen voor natuurkwaliteit
* realisatie van de EHS leidt tot de duurzame instandhouding van de biodiversiteit in Nederland;
De natuurkwaliteit kan worden verhoogd door meer oppervlakte natuur en de realisatie van grotere eenheden natuur. Met gebruik van een even groot areaal is de kans dat bepaalde diersoorten in een gebied voorkomen bij een aaneengesloten gebied aanzienlijk groter dan bij versnipperde gebieden.
* functiecombinatie met water kan leiden tot een vergroting van de oppervlakte natte natuur

Participant 39 (Notepad Condition without Stock Issues)

A) huidig beleid Rijk t.a.v.EHS
Het kabinet Balkenende-2 reserveert in de periode 2004-2007 700 miljoen euro extra voor natuur en reconstructie, waarvan ruim 400 miljoen voor de realisatie van de Ecologische Hoofdstructuur (EHS). Daarmee is voldoende geld beschikbaar om het voor de komende kabinetsperiode beoogde areaal EHS te realiseren.

De doelstelling van de EHS is drieledig, namelijk het realiseren van het areaal EHS, een samenhangende EHS met een hoogwaardige natuurkwaliteit

B) Gevolgen Nota Ruimte voor EHS
- Door de Nota Ruimte 160.000 hectaren is er voor de komende 30 jaar ruimte nodig voor rode ontwikkelingen. Dat heeft ook een grotere druk op de EHS tot gevolg;
- de milieukwaliteit in en rond de EHS ongeschikt voor de gewenste natuur. De depositie van stikstof op het land en de gehalten aan fosfor in het water zijn te hoog en zullen ook in 2018, wanneer de EHS klaar moet zijn nog niet genoeg zijn gedaald.De bestrijding van de verdroging van natuurgebieden loopt ver achter op het doel.Het voornemen om de Wet ammoniak en veehouderij (2002) alleen van toepassing te laten zijn op de zeer kwetsbare natuur en niet meer op de kwetsbare natuur;
- Tot op heden is de uitvoering van de plannen voor blauwgroene dooradering echter nog niet gestart, door onduidelijkheid over de beschikbaarheid van geld. Na concrete begrenzing vertoont tweederde van de EHS een matige of onvoldoende ruimtelijke samenhang (MNP, 2002).

Toelichting:
Hoewel toelatingsplanologie tot dusverre dus heeft gewerkt voor bestaande natuurgebieden, zal de komende jaren de druk steeds groter worden om nieuwe en vaak ook intensievere rode functies toe te staan op de plaats van oude. Daarnaast vallen zones rond kwetsbare natuur niet langer onder de Wet ammoniak en veehouderij. Daarmee blijft het mogelijk dat intensieve veehouderij uitbreidt of zich nieuw vestigt dichtbij kwetsbare natuurgebieden. Dit kan leiden tot een toename van de ammoniakdepositie op deze natuur, terwijl het beleid juist een reductie van de depositie beoogt. Van de circa 130.000 ha kwetsbare natuur waarvoor de zoneringsmaatregel niet meer geldt, is circa 40.000 aangemeld onder de Vogel- en/of Habitatrichtlijn. De bescherming van deze gebieden tegen de 'externe' werking van ammoniak is waarschijnlijk niet te realiseren zonder aanvullende ruimtelijke zoneringsmaatregelen, als aanvulling op het generieke ammoniakbeleid.

De globale zoekgebieden voor groene contouren in de Vijfde Nota suggereren dat er grote stukken aaneengesloten natuur zullen ontstaan. De concrete begrenzing van de EHS op regionale en lokale schaal resulteert tot nu toe, nadat circa 85% is begrensd, echter in een meer versnipperd beeld. De effectiviteit van het EHS-beleid blijft daarmee beperkt. De Vijfde Nota geeft vooralsnog niet aan hoe deze versnippering kan worden tegengegaan met het groene contourenbeleid. De tussenliggende, niet in de EHS opgenomen gebieden, zouden wel alsnog als natuurontwikkelingsgebied of als beheerslandbouw onder de groene contour gebracht kunnen worden

Een bestemming natuur betekent in de ruimtelijke ordening niet dat daar niets meer mogelijk is. Wanneer gemeenten

bestemmingsplannen willen bijstellen om rode ontwikkelingen in de EHS mogelijk te maken, wegen provincies het maatschappelijk belang van de betreffende rode ontwikkeling af tegen het belang van natuurwaarden.

C) Conclusies:

De realisatie van de EHS heeft grote risico's omdat de sturing van de rijksoverheid op de EHS afneemt.Vertaling in planologie is dus essentieel voor planologische bescherming. Het beleid voor de ecologische hoofdstructuur is in oude bestemmingsplannen nog niet doorgewerkt.

Door het streven van het kabinet-Balkenende om een groter gedeelte van de nieuwe natuur door particulieren te laten ontwikkelen, dreigt een verdere vertraging.Bij particulier beheer kan de overheid minder sturen op een samenhangende EHS.

Omdat leefgebieden van soorten verschuiven is er geen garantie dat soorten in de toekomst in de speciaal voor hen aangewezen natuurgebieden blijven. Dit geldt ook voor de soorten in de Vogel- en Habitat richtlijngebieden, die Nederland op grond van Europese verplichtingen moet beschermen.

D) Maatregelen om doelen EHS te halen

Van het Rijk zijn volgens de Nota Ruimte geen extra maatregelen te verwachten, anders dan het extra`geld. De provincie krijgt een belangrijker rol en maatregelen zijn dan ook vooral provinciaal vormgegeven.

Planologie (actie Rijk, gemeenten, provincie)
Advies: streek- en bestemmingsplannen op orde en handhaven.
Toelichting: De ruimtelijke bescherming van de natuur heeft effect en kan weerstand bieden aan de sterke stedelijke druk op deze gebieden.'Toelatingsplanologie' werkt voor bestaande natuurgebieden.

Ruimte voor Ruimte 1 (provincie, gemeenten)
Advies: uitplaatsing rood
Toelichting: De sloop van bebouwing op kwetsbare plaatsen kan men financieren uit een verdere ontwikkeling van reeds aanwezige rode functies op andere plaatsen die geen deel uitmaken van de ecologische hoofdstructuur. Per saldo zou de omvang van het rood moeten afnemen. Hiervan bestaat al een praktijkvoorbeeld (Heuvelrug).

Ruimte voor ruimte 2 (provincie, gemeenten)
Advies:toepassen contouren
Toelichting: De Vijfde Nota stelt een beleid voor waarbij de provincies een belangrijke rol spelen bij de bescherming van natuur en landschap. De ruimtelijke schaal waarop door de provincies invulling gegeven zal worden aan de restrictieve groene contour is namelijk sterk bepalend voor de uiteindelijk resulterende kwaliteit. Voor extra landschapsbescherming zijn provincies aangewezen op provinciale landschappen, die in de balansgebieden liggen en kwetsbaar kunnen zijn bij de in de toekomst door gemeenten vast te stellen rode contour, en de vijfjaarlijkse herijking daarvan. Zonder duidelijke criteria voor de begrenzing van de groene contour (zoals zeldzaamheid, internationale betekenis en kwetsbaarheid) en de aanwijzing en wettelijke bescherming van provinciale landschappen, zal het moeilijk zijn om tegendruk te bieden aan de economisch gedreven functies.

Ontsnipperen (provincie)
Advies: grotere eenheden
Toelichting: De natuurkwaliteit kan worden verhoogd door meer oppervlakte natuur en de realisatie van grotere eenheden natuur. Met gebruik van een even groot areaal is de kans dat bepaalde diersoorten in een gebied voorkomen bij een aaneengesloten gebied aanzienlijk groter dan bij versnipperde gebieden. De in de Vijfde Nota na te streven natuurkwaliteit is afhankelijk van de schaal waarop door de provincies aan de ruimte bestemming wordt gegeven.

NB
1. Gebruikte bronnen: alleen RIVM?
2. Plaatjes tussen zetten (bouw in de Netto EHS -