

Formulating knowledge



# Formulating knowledge

Engaging with issues of sustainable development  
through academic writing in engineering education

Ann-Marie Eriksson



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*in tender memory of Göte Johnsson, my father*



## Abstract

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Given that knowledge in society is increasingly shaped by textuality and dependent on texts, higher education holds a special responsibility for introducing and guiding students into text practices contingent on disciplinary fields and their knowledge traditions. On a general level, this doctoral thesis investigates how participation in such text practices at university functions as a means for engaging students with knowledge that is new to them. Two aims have been pursued across three empirical studies in the setting of supervision of an academic writing assignment in engineering education. First, the thesis aims at illuminating challenges involved as students and teachers are engaging with knowledge through text practices. Second, the thesis aims at making visible what communicative work such challenges entail.

The empirical material comprises video recorded supervision sessions where sequential drafts of an academic writing assignment on issues of sustainable development are being discussed. Given the sociocultural and dialogical perspective this thesis is grounded in, text production is understood as a mediating activity and a process of gradual appropriation of disciplinary practices. Methodologically, such premises imply a detailed investigation of text production as practical work, empirically analysed as interactional, communicative processes and from the participants' perspective.

The studies have provided insights into three salient challenges in this type of text production. Study 1 addresses the problem of how supervision provides a site for taking initial steps into a disciplinary field and its knowledge traditions. Study 2 focuses on referencing as a contextualizing and recontextualizing practice where knowledge of a field needs to be transformed

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for new purposes. Study 3 addresses challenges involved in grounding conclusions in alignment with a particular knowledge field.

The analyses show that formulating knowledge is a demanding process for both students and teachers. Writing a report on issues of sustainable development exemplify advanced practices that do not lend themselves to easy explanations and straightforward instruction. Dealing with specific matters about specific issues, negotiating alternative ways of formulating text and testing alternative solutions to specific textual problems seem to have the potential of guiding students into dialogue with a field. Based on the conclusion that this type of orientation seems to require time and recurrent encounters where gradually more concrete aspects of epistemic practices can be unfolded and experienced, it is argued that an orientation of this kind may be difficult to take on one's own - especially for someone in the role of a student.

Keywords: supervision, academic writing, engineering education,  
sociocultural theory, disciplinarity, interaction analysis



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This is it.

The work is done.

This book is practically on its way to the print shop.

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## Part 2: The empirical studies

- STUDY 1: SUPERVISION AT THE OUTLINE STAGE: INTRODUCING AND ENCOUNTERING ISSUES OF SUSTAINABLE DEVELOPMENT THROUGH ACADEMIC WRITING ASSIGNMENTS.
- STUDY 2: REFERENCING AS PRACTICE: LEARNING TO WRITE AND REASON WITH OTHER PEOPLE'S TEXTS IN ENVIRONMENTAL ENGINEERING EDUCATION
- STUDY 3: REACHING CONCLUSIONS IN ACADEMIC PAPERS: THE RHETORICAL WORK OF DESIGNING CLAIMS IN ENVIRONMENTAL ENGINEERING EDUCATION

# Part 1

Formulating knowledge





# Chapter 1

## Introduction

The background of the research to be reported in this thesis, is an interest in how students encounter and appropriate text practices, i. e. how they learn to produce and formulate knowledge in academically acceptable and relevant manners. An important element of their learning and enculturation into disciplinary epistemic practices (Starke-Meyerring & Paré, 2011) is supervision by teachers who are experts in the area in which they study, which in this case is environmental engineering and environmental systems analysis. My focus is supervision as a process of guidance into disciplinary forms of knowledge production (Dysthe, 2002), and especially how students and teachers negotiate how texts should be organized and what are expected manners of formulating arguments and drawing conclusions. The particular type of document that students are to produce is a report, a text where an issue of sustainable development is explored and analysed, from a range of perspectives and where solutions are suggested and argued for. This implies that students are expected to produce locally relevant knowledge that can serve as a basis for interventions into societal activities. Thus, in order to be accountable as experts, students have to learn how to ground their reasoning as well as conclusions in relevant disciplinary knowledge, and operationalize how a solution of an identified environmental problem can be argued for.

Taking a sociocultural (Säljö, 2005; Wertsch, 1998; Vygotsky, 1978) and dialogical (Bakhtin, 1981; Linell, 2009; Rommetveit, 1992) approach, the general interest of my work has been to investigate how participation in text practices functions as a means for engaging with knowledge that is new to the individual. In concrete terms, the thesis explores how Master's degree students together with their teachers, deal with the exploration, formation and textual presentation of issues of sustainable development as part of the students' task of writing a report. Three empirical studies provide analyses of

textually mediated (cf. Mäkitalo, 2012), communicative work carried out as part of supervision around these students' emerging reports. The intention of the empirical studies is twofold. First they aim at illuminating concrete challenges involved as students and teachers engage with knowledge. Secondly, an additional aim is to make visible what communicative work such challenges entail. By examining what encountering and engaging with knowledge domains through textual practices involve, the thesis finally attempts to point towards and discuss implications of dealing with new forms of knowledge for initiating processes of enculturation in educational settings.

Academic writing assignments have a very long history as part of instruction at university. At present, such assignments stand out as one of the most frequently adopted and trusted pedagogical methods for introducing university students to professional knowledge domains and their discourses (e.g. Hyland, 2013b; Starke-Meyerring, Paré, Artemeva, Horne, & Yousoubova, 2011). This dual function implies that qualities of a report are attended to as demonstrations of qualities of knowledge, or as capabilities of the individual author of that paper. One consequence for students is that they are dependent on adapting to norms and conventions for producing academic texts, while simultaneously using what they know for the purpose of producing text to demonstrate knowledge. Such challenges have been thought of as putting specific demands on the individual student: there is a need to produce written text that qualifies within academia, and there is a simultaneous need to use what is considered as knowledge within particular disciplinary fields (cf. Berge, 2007) for the purpose of producing a text that is to serve for example as a report. In modern society, universities hold a special responsibility for finding ways of facilitating students' participation in disciplinary ways of reasoning and producing knowledge (Bazerman, 2009; Starke-Meyerring et al., 2011).

As the production of text holds such a special status in higher education, it also attracts considerable attention. One example of this is the emphasis it has received as a curricular concern. This concern has been articulated in recent reforms of higher education<sup>1</sup>. In such policy contexts text production has been promoted as a strategic skill that should be trained by, and acquired

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<sup>1</sup> Cf. the [European Qualifications Framework](#) promoted within the Bologna Process and European Commission on Education and Training (2011).

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through, higher education. This kind of attention has therefore brought about a number of concrete efforts concerning educational development<sup>2</sup> that emphasize what has pragmatically been termed writing-to-learn and learning-to-write<sup>3</sup> (Poe, Lerner, & Craig, 2010; Tynjälä, Mason, & Lonka, 2001). Additionally, and on a global scale, one can see that universities have increased their efforts through writing centres and specific programmes in support of students' work with academic writing (Thaiss, Bräuer, Carlino, Ganobcsik-Williams, & Sinha, 2012). While increased attention of this kind speaks to a practical side of students' text production, it also speaks to the significance of text production for the transformation of thinking and for development (Bazerman, 2009). Along such lines of reasoning, it has been pointed out that academic writing assignments not only contribute to new ways of organizing education, but also offer important opportunities for participating in disciplinary fields and their knowledge traditions through textual practices.

Questions about the relationship between processes of producing academic text and processes whereby students appropriate knowledge can be found in a variety of research fields. One major path has been to empirically follow trajectories of students or texts between progressively structured educational settings, and then analyse the texts produced as manifestations of learning (Artemeva, 2008, 2009). Along a related path, analysts have followed the development of disciplinary becoming in terms of individuals' gradual mastering of "genre conventions" (Dressen-Hammouda, 2008) with an interest in transformations of identity (Ivanič, 1998, 2005). On the basis of students' texts, studies of these kinds have documented that individuals change over time and in relation to local conditions of the settings where they engage. In contrast, text production has also been seen as a process of discovering and exploring a disciplinary field and as a process of engagement with knowledge. Processes of this kind have for example been understood as related to mastering conventionalized disciplinary ways of producing texts (cf. Berkenkotter & Huckin, 1995; Hyland, 2004; Miller, 1984), and of operationalizing conventionalised text types in alignment with the knowledge traditions of a particular field. As text practices and the practical work of

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<sup>2</sup> Cf. the global CDIO initiative as a prominent example in the specific context of engineering education (Crawley, Malmqvist, Östlund, Brodeur, & Edström, 2007/2014)

<sup>3</sup> This term is often used in pedagogical practice and signifies a pedagogical arrangement where writing is used with the explicit, twofold intention of scaffolding students' development in content areas and their ability to produce text.

producing text are located within workplaces (Karlsson, 2009), disciplinary fields (Winsor, 1996), institutions and discourse practices (Bazerman, 1997a), writing processes have been understood as dimensions of the work through which disciplines and their ways of functioning are established, reproduced and developed. Historically developed practices and social languages can take the shape of certain content, forms and structure in text. Bazerman formulates this interrelationship as a distinctly communicative concern for writing processes: “the typification embedded in genre is one of situation, possible response, motives realizable through imaginable actions, and projections of possible futures” (1997a, p. 302). According to Bazerman’s line of reasoning, conventions and norms for how, for example, issues of sustainable development are to be reasoned about and presented in order to make textual sense (Mäkitalo, 2012), become part of what needs to be displayed in order for the individual to act in answerable ways. One consequence of this view seems to be a need for an empirically grounded understanding of what it involves to be introduced to a disciplinary field and its genres through academic writing assignments. Empirical evidence of how such processes take place could therefore offer additional insights about academic writing as a significant dimension of university students’ developing expertise.

Practical problems in this general area, however, have often been addressed through applied research and intervention studies (Bangert-Drowns, Hurley, & Wilkinson, 2004; Wingate, Andon, & Cogo, 2011). It can be noticed that such studies of writing assignments in educational settings are commonly premised on the teaching and instructing of either science *per se* or text production *per se*. By setting out from rationales that have evolved as part of traditions of teaching and instruction to answer the question of what it is that is difficult or efficient about learning with academic writing, such studies often risk mixing up the study of text production processes with formal aims of education. In other words, if teaching and instruction are taken as givens and left unproblematized, there is a potential risk of reproducing metaphors of writing as a discrete, transferable skill (cf. Sfard, 1998). As an addition, this thesis aims to investigate the practical work of producing texts for specific, pedagogical purposes from the perspective of students and teachers who are involved in such work, i.e. from the participants’ perspective. What challenges emerge in supervision sessions as university students encounter, explore, negotiate and reformulate knowledge of a scientific field by producing texts of their own?

## Research problem and aims

This thesis is grounded in sociocultural theories and research on learning and development (Säljö, 2005; Wertsch, 1991, 1998, 2007; Vygotsky, 1978, 1986). Moreover, dialogism and its epistemologies of mind (Bakhtin, 1981; Linell, 1998, 2009; Volosinov, 1986) mark an additional point of departure. What this renders is a perspective where learning processes and developmental processes converge (Vygotsky, 1978, p. 90). Learning and developing through text production is thereby viewed as a process that is fundamentally social, cognitive and material. Prior expresses this conception as follows:

Writing involves dialogic processes of invention. Texts, as artifacts-in-activity, and the inscription of linguistic signs in some medium are parts of streams of mediated, distributed and multimodal activity. Even a lone writer is using an array of socio-historically provided resources (languages, genres, knowledge, motives, technologies of inscription and distribution) that extend beyond the moment of transcription and that cross modes and media (reading, writing, talk, visual representation, material objectification). (Prior, 2006, p. 58)

Accordingly, engaging with knowledge by means of producing text involves dealing with socio-historically developed knowledge traditions. The individual, however, first encounters those traditions as rather discrete units, and only in part and through practices that make up a larger ‘whole’. Engaging with knowledge through text production therefore involves “a dynamic transition from minimal appreciation of the meaning and functional significance of a sign form to ever increasing levels of sophistication” (Wertsch, 2007, p. 191). Processes of formulating knowledge through participation in practices are, as a consequence, viewed as processes of enculturation through mediated action (Wertsch, 1998).

As regards genre and disciplinarity<sup>4</sup>, the thesis also draws on theories of genre as social action (Bazerman, 2012a; Miller, 1984). Such perspectives view disciplines and their text practices as intertwined (Bazerman, 1997). Given that academic writing assignments commonly are framed in terms of textual formats, such as a summary or a report, students are presented with more or less specified situations and textual expectations on their written work that

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<sup>4</sup> In this thesis, I use the notion of disciplinarity to refer to the fact that the knowledge and perspectives that students are expected to identify and work with belong to a field of knowledge, for example environmental engineering. Thus, I am not implying that this field should be understood as a unified discipline and will come back to this term in Chapter 3.

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point out certain practices. While using the term genre, Bazerman reasons about the consequences of such textual expectations in terms of a problem space:

...genres identify a problem space for the developing writer to work in as well as provide the form of the solution the writer seeks and particular tools useful in the solution. Taking up the challenge of a genre casts you into the problem space and the typified structures and practices of the genre provide the means of solution. (Bazerman, 2009, p. 291)

By highlighting the dialogical nature of text practices and links between learning, development and what this thesis refers to as textual genres (see Chapter 3), Bazerman points towards the nature of the challenge for students who need to operationalize disciplinary knowledge. In line with this reasoning, the perspective to be gradually developed here holds text production processes as a form of “assimilation of the fundamentals of scientific knowledge” (Vygotsky, 1978, p. 84). Taken together for the purposes of this thesis, such premises blend into a study of text production as practice and mediating activity (Prior, 2006). Methodologically, such a perspective implies a detailed investigation of text production as practical work, as interactional, communicative processes from the participants’ perspective. By such attention to what it involves to be teaching and studying through writing assignments, this thesis will be in line with other empirical studies that explore textual work and literate activity as mediating processes and instances of situated, disciplinary practices (cf. for example: Bazerman, 2012b; Molle & Prior, 2008; Prior, 1998). In accordance with such a view, this thesis aims to address challenges that arise as part of guiding students into knowledge traditions and discourses in the context of environmental engineering education and, more specifically, environmental systems analysis. As has been mentioned, the empirical site consists of supervision sessions where students and teachers work with issues of sustainable development on the basis of text drafts the students have produced. Taking a dialogical approach to supervision as a communicative practice, the analytical attention is focused on at communicative tensions that emerge as the participants jointly and dialogically (Bakhtin, 1981; Linell, 2009) orient to the disciplinary field with the purpose of producing a report (see assignment description in Appendix 1) as part of university course work.

## CHAPTER 1

The empirical setting investigated was located in an introductory module on sustainability assessment, where an internationally mixed group of 14 Master's degree students carried out individual academic writing assignments, i.e. reports, as part of their technical content course. Each individual writing assignment covered one specific issue of sustainable development, referred to as a subject in the instructions for the assignment. These subjects regarded issues related to areas such as international trade, or water supply, or energy consumption and its role in sustainable development, a (see appendix for the assignment descriptions). Video recordings from 33 supervision sessions distributed across the 14 cases (see Chapter 4) make up the primary empirical material. Text drafts, written comments and notes collected from the studied setting during fieldwork have been used in the analyses when they were made part of the participants' interaction.

In broad terms, the three empirical studies that constitute the second part of the thesis, i.e. Part 2, highlight a series of significant and critical aspects of text production in higher education as they emerge in the interaction around the drafts for the assignment being discussed. As will be shown, the analytical work has consisted of exploring and analysing challenges related to the production of the reports from the participants' perspective. More precisely, the study investigates how students and teachers interactively oriented to, verbally topicalized and communicatively dealt with particular features of the texts as they were related to the performing and reporting of an engineering study. As mentioned, the analytical focal point is directed at concrete challenges that emerged in the interaction by means of the textual appearance of students' drafts. Expressed in a more Bakhtinian sense, three empirical studies illuminate a series of practices and activities where the participants respond to and "learn to cast [their] speech in generic forms" (Bakhtin, 1986, p. 79) relevant to environmental engineering and specifically to environmental systems analysis.

### Outline of the thesis

The remainder of Part 1 of the thesis outlines the research problem and points out its significance for pedagogical practice. It also points out the theoretical and methodological foundation for investigating the practical work of formulating knowledge through text production. Part 2 consists of the three empirical studies. In order to provide a sense of location for the type of

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research reported here, Chapter 2 traces how questions of academic text, text production and disciplinary knowledge have been approached in a selection of related studies. The intention of this review is to provide a wider context for the study together with a more nuanced picture of the research problem. The purpose of Chapter 3 is to outline the sociocultural and dialogical approach to practice that has been taken. This is done by discussing what it implies to encounter new knowledge by means of producing academic text in the light of a few significant theoretical premises. To provide a richer picture of the empirical work than has been possible to do in the separate studies, Chapter 4 first describes the empirical case and then outlines the methodological design of the research. This section also comments on ethical considerations connected to the data production. The three empirical studies incorporated in the thesis are summarized in Chapter 5. Chapter 6 reflects on the empirical findings to elaborate the arguments. By doing this, the thesis is concluded with a discussion about the role of writing assignments for processes of knowing. The key points of the thesis as a whole are summarized in Swedish in Chapter 7.



# Chapter 2

## Studies of text production and learning

As was pointed out in the introductory section, this thesis project stems from an interest in how students encounter and engage with knowledge contingent on disciplinarity through text production, and especially through academic writing assignments. An essential source of inspiration for my work comes from research where disciplines, their text practices and knowledge traditions have been regarded as socially constituted processes of disciplinarity (Prior, 1998; Prior & Bilbro, 2012), where students and teachers participate and contribute (Bazerman & Prior, 2005). My interest is also based on research on knowledge processes where text production in academic settings is central, and where it has been viewed as situated and mediated action (Wertsch, 1998; Vygotsky, 1978, 1986).

In this chapter, I will first give a broad context for the research interest I pursue in this thesis. Whereas this type of overview usually covers a series of specific research fields and their different approaches to a specific problem, I have chosen to first bring together studies from fields operating in the area of academic writing. This, I feel, productively positions my study in a research domain that is immensely diversified, and where the term writing has been used in quite different ways (Prior & Thorne, 2014). Following this brief introduction, the chapter is structured around an inventory of questions close to my own. I have drawn this line in order to be able to take stock of central questions that have been asked about enculturation through text production and what such studies have to say about academic writing assignments as an approach for students to take on new kinds of knowledge.

## Academic writing and student learning

An initial reflection when commenting studies in the area of academic writing and students' learning is that many studies take their point of departure in the term genre, even though the term is being used in many different ways. Miller's (1984) article, *Genre as Social Action*, is usually referred to as an especially important contribution here (cf. Bawarashi & Reiff, 2010; Ledin & Berge, 2001; Russell, 1997) as it defines genres as socially based textual patterns that reflect recurring social actions, for example in disciplinary settings. Helping students with their academic writing is then partly a matter of teaching the typification embedded in genre. From such a point of departure studies of academic writing have begun investigating increasing literate demands on individuals in knowledge societies (Bazerman, Bonini, & Figueiredo, 2009; Starke-Meyerring et al., 2011; cf. Strand & Karlsson, 2012) and in what ways universities can help students with their academic writing and learning (Hyland, 2008; Russell, Lea, Parker, Street, & Donahue, 2009). This type of interest can be noticed in several fields that articulate a particular attention to higher education, for example: English/Language for Specific Purposes (Bowles, 2012; Fortanet & Räisänen, 2008; Hyland, 2008, 2013a) which is a field originally forged on linguistic approaches to texts; Integrating Content and Language in Higher Education (ICL) where the combination of content and language based instruction in higher education is in focus (Dalton-Puffer, 2011; Eriksson & Carlsson, 2013; Fortanet-Gomez, 2013; Jacobs, 2005; Paretto, 2011, 2013); and, Writing to Learn (Canagarajah, 2011; Hirvela, 2011; Newell, 2006; Tynjälä et al., 2001) that can be traced back to Emig who drew on Vygotskian ideas to reason about writing processes as closely related to learning processes (Emig, 1977). The common denominator across those fields is a strong emphasis on educational interventions and curricular change.

Emig's work has also been very influential in the Writing Across the Curriculum (WAC) movement (Young, 1994, 2006; Young & Fulwiler, 1986) and its counterpart Writing in the Disciplines (WID) (Carter, 2007; Deane & O'Neill, 2011; Thaiss & Zawacki, 2006). Like the other fields introduced above, WAC/WID studies have commonly raised questions driven by didactical ideas and teaching initiatives in relation to how students learn academic writing (Bazerman et al., 2005). It has often been an explicit goal in both of those fields to address questions of how requirements postulated by a

## CHAPTER 2

certain text type, or by what has been termed genre, can facilitate learning in content areas. Accordingly, and as pointed out by Russell, Lea, Parker, Street and Donahue (2009), while the concept of genre has been treated in social and cultural terms in movements like the WAC, the analytical approaches have differed. Common approaches are for example to find how students engage in different types of processes depending on the genre they are expected to produce (Russell et al., 2009, p. 408) or relationships between the work of producing texts, text documents and the contexts (often in the Activity Theory parlance of activity-systems ) where texts are being produced (Russell & Yañez, 2003).<sup>5</sup> One point about the focus of this thesis is to empirically investigate more precisely how students encounter genres and are provided means for working with them in specific situations.

The interrelatedness of texts, text production and how people come to know marks another gigantic field. For the purposes of this thesis, I have chosen to treat this interrelatedness as a matter of culture and will discuss two primary paths along which such interests have been pursued in previous research. One way has been to approach questions about text production and disciplinary traditions as a matter of how people come to define themselves and manifest their identities through text. Another way has been to approach such questions as a matter of entering academia and as processes of enculturation.

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<sup>5</sup> Other research has pointed out that efforts in understanding relations between individual writing processes and the settings in which those writing processes take place have commonly sought ways of combining social theories with constructivist models (Hayes, 2006). However, it seems as if it is difficult for such perspectives to avoid a strong tendency to view the individual as acting within a given and definable context of knowledge. Studies based on such perspectives have been criticized for a tendency to push knowledge “outside of the activity of writing” (Canagarajah, 2011, p. 112), and in so doing bypass issues of how texts and text production are interrelated with disciplinary forms of life. Research on the role of academic writing that has taken a cognitive, constructivist approach has often assumed metaphors of ‘learning to write’ in disciplinary settings that promote ideas about the progressive acquisition of particular writing skills. Part of that metaphor is a view of text production as a systematic problem-solving processes (as pointed out by Tynjälä, Mason & Lonka, 2001, p. 2), including a distinct planning stage where ideas are generated, a stage where those ideas are transformed into text and a revision stage through which the quality of the text is improved

## Text production and membership in disciplinary cultures

Enculturation involves acting as a member of a disciplinary culture. Research about how students gradually acquire membership in disciplinary communities through their academic writing has often followed and examined series of students' texts in combination with observations or interviews (cf. Berkenkotter, Huckin, & Ackerman, 1988; Duff, 2010) to trace individuals' development. By investigating disciplinary variation through textual analysis and interviews, North (2005) has made the observation that social and epistemological differences between disciplines are reflected not only in students' texts but also in their ways of producing text. Drawing on a total of 61 essays produced by 10 arts students and 10 science students in four different subjects<sup>6</sup> North found a series of epistemological variations in how students from the different disciplines framed and responded to their tasks. By linguistic examination of texts these students produced as part of a course on the history of science, it was found that arts students were concerned with ascribing claims put forward as conditioned on different perspectives and views, whereas science students had a tendency to accept claims: "While the 'arts' student presents the object of study as mediated through the interpretations of historians, for the 'science' student it is as though the facts speak for themselves" (p. 523). This finding was further substantiated through a linguistic analysis of the teachers' comments on the students' texts. Science students from science tended to describe facts at the expense of interpretation and evaluation of what they had read. Furthermore, from interviews with 17 of the students, and from a supplementary questionnaire, North also found differences in the ways students produced text and linked those to their disciplinary background. Science students reported making single drafts and single revision cycles, whereas arts students generally made several revisions over an extended period of time to develop and structure their arguments (p. 526). North links such difference of the text production to views and traditions of knowledge in the students' different fields that were carried through in the writing assignments and uses a quote from Larry, a science student, as an illustration of this: "I'm used to, these are the facts, with maths

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<sup>6</sup> The subjects were science in medieval Europe, the impact of the Inquisition, 17th century French natural philosophers and the role of Linnaeus in botany.

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it's straightforward, it's either right or wrong really, you're not flowering it up with words" (p. 528). Drawing on these findings it was concluded that "academic performance is affected by students' conceptions of knowledge" and "that these may be subject to disciplinary variation" (p. 529). Thus, North locates the distinctions that were made between the two student groups with their different disciplinary backgrounds.

Whereas research like North's study explains that variation in students' texts and students' different ways of approaching text production is tied to their disciplinary backgrounds it also points towards questions about how such forms of disciplinary enculturation takes place over time. Through textual analysis of a series of documents accounting for field work on geological sites, Dressen-Hammouda (2008) investigated how a geology student's developing disciplinary identity as a geologist allowed him to gradually produce a textual genre that was typical and central to this field, with improving expertise. An analysis of what is termed field accounts this student produced across undergraduate, Master's and PhD level showed that even though the text type was the same across six years of education, the student's way of writing changed over time, together with his gradually increased level of expertise in the disciplinary field.

On the assumption that disciplinary identity is made visible in text and can be related to the use of linguistic structures that characterize typical textual genres of the field, for instance the investigated field account, the study reviewed here sets out from the premise that writing as a geologist involved using implicit cues to situate oneself and one's level of expertise within a community of practice. In Dressen-Hammouda's parlance such cues are called *symbolic genres* that:

...range across a number of semiotic fields and include knowledge about disciplinary behavior as well as shared attitudes and practices. They are the historically sedimented structures of the discipline's history – its ways of being, seeing, interpreting, behaving and thinking – that are passed down from one generation of field geologists to the next, partly in the classroom and through outside reading but especially during yearly field trips during which students intensely interact with their instructors and the structures they encounter in the field. Over time, students as emerging practitioners come to share the discipline's symbolic genres as similar ways of being, seeing and acting together (p. 238)

It was found that while mastering the field report was a matter of "knowing how to say the right thing the right way at the right time" (p. 239), mastery

also implied employing what Dressen-Hammouda refers to as symbolic genres shared within geology. For instance, from a text the student produced during undergraduate education, it was found that while the student adopted a certain specialist and disciplinary jargon, the purpose demonstrated in the text was "less the need to inscribe his findings within a larger bed of community knowledge than to demonstrate to his professors that he has correctly carried out the assigned field exercises" (p. 244). Further on, and from analyses of a text produced at Master's level, it was observed that the student used a higher degree of linguistic cues that experts in this field would use to convey their competence in the sense that those cues were employed in ways that pointed out *symbolic genres* of the field. However, the analysis also showed a few problems with how those cues were employed. For instance, the student's interpretations about findings made on a geological site were not supported by evidence but stated as facts. It was concluded that the student was demonstrating to his teachers that he had understood the geological site he investigated and what was found there rather than convincing other people about the quality of the interpretation made. Analysing the third text, produced at PhD level, however, it was observed that the student now made a rhetorical effort to have his claims about the investigated geological field accepted. The text produced at this stage displayed patterns of reasoning and arguing that could be recognizable to the field. What was more, in his text the student also drew attention to his own role of being a researcher. On the basis of this, the study concludes that "the process of disciplinary [be]coming shows us how students, like Patrick, must master an *entire* semiotic genre chain that underlies their discipline's specialist activity in order to begin writing like specialists" (p. 249).

According to Dressen-Hammouda, the gradual change in Patrick's stance shows that disciplinary identity is linked with the production of text. It can however also be noted that this student's texts change in relation to the progression of his education in geology which implies that he also becomes increasingly accountable for his interpretations of the findings made during fieldwork. Whereas textual cues were initially productive for producing text, texts produced at later stages demanded that his reasoning about and argument for the significance of his interpretations was made explicit in his texts. In my opinion, though, although studying a process of entering a discipline as a matter of identity and from analysing texts can demonstrate important relations between people's disciplinary belonging and their texts,

the studies by North and Dressen-Hammouda also point towards other questions, for example regarding how such becoming is shaped. Such questions have for instance been approached through concepts like enculturation.

## Text production and processes of enculturation

Investigations with an interest in relations between text production and enculturation in educational settings have often drawn on the concept communities of practice as formulated by Lave and Wenger (1991; Wenger, 1998). On the basis of their studies of people's developing expertise, Lave and Wenger expressed "a decentred view of master-apprentice relations" (1991, p. 94) and "that mastery resides not in the master but in the organization of the community of practice of which the master is part" (p. 94). This idea of community has often acquired somewhat stable and distinct features and has been taken up in studies about individuals' initiation into knowledge domains, about access and mastery of knowledge. For instance, the field of Rhetorical Genre Studies (Schryer, 2011) has demonstrated that "knowledge of genre conventions and understanding of the audience's expectations" (Artemeva, 2009, p. 172) can support processes of enculturation into disciplines and entail mastery of their typical textual practices. Among others, Artemeva (2005, 2008, 2009) has addressed the question of what it means for engineering students "to master domain-specific genres and, in particular, the genres of engineering" (2009, p. 171) by a case study stretching across six years. By following four cases ethnographically, first through one of their engineering communication courses at university, and then in their subsequent workplaces through e-mail conversation and personal interviews, it was found that those students could gradually make useful connections between text types trained in academia and tasks they encountered at work. The results show a series of factors (here called *genre ingredients*) involved as individuals are operating with specific text types. Artemeva (2009, p. 172) terms them: genre conventions, understanding of audience's expectations, agency, cultural capital, domain content expertise, formal education, private intention, understanding of the improvisational qualities of genre, and workplace experiences to be involved as the individuals operate with specific text types.

Additionally, the results of this study show that there is a high degree of flexibility involved as individuals carry out concrete, written work in response

to everyday situations in their workplaces, for instance proposals about potential products and projects relevant to their managers. It was also found that gaining “access to a repertoire of appropriate engineering communication strategies that were regulated (because they were immediately recognized as such by management and clients)” (2005, p. 409) was but one part of making a successful proposal. Such strategies were “at the same time *improvisational* (because they were distinctly different from the practice of that particular workplace)” (ibid., p. 409). The results therefore emphasize the interrelational aspects as being central in how people get into genres.

In a meta-study that compiled and reviewed empirical work around what they term academic enculturation from a broad perspective, Prior and Bilbro (2012) found that enculturation often is understood as involving interrelationships between “textual forms, literate and semiotic practices, identities, and social formations in dynamic and historical trajectories” (p. 31). It is, however, common to follow either individuals or texts in studies interested in enculturation into disciplines and to investigate how enculturation is ‘being done’ to students, for example through teaching.

Alternative approaches have asked questions directed at text production and enculturation as an intertwined, situated process. For instance, by means of a series of qualitative case studies from four different sites (summary writing and research proposals in language studies, essays in geography, a conference paper and a research proposal in sociology, and, an essay in American studies), Prior (1995, 1997, 1998) has investigated text production in educational settings under the term literate activity. Generally, those case studies involved following students, teachers and seminars directed at the students’ texts by ethnographically informed methods, by interviewing students and teachers, and by collecting and analysing original texts as well as commented versions of those. With respect to enculturation, this research found that voice and authorship that can be said to characterize someone ‘encultured’ were shaped over time and together with multiple interactions around the students’ work (1997, 1998). Across the studied cases, both students and teachers needed to align the personal actions with functions, representations and processes typical of the discipline. For instance, while a step-wise reworking of a project proposal document involved personal adjustment of this kind on the student’s part, the teacher had to deal with how the student resisted and approached the task to make disciplinary expectations explicit and comprehensible.



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This type of co-authoring and co-production of disciplinary practices was also at work in the case of a graduate seminar (1998). Here, for instance, the textual formulation of one student's research hypothesis gave rise to an intense discussion by which disciplinary procedures for doing this particular kind of research were brought into the seminar conversation. The hypothesis was first criticized as too ordinary or commonsensical, then compared to previous insights concerning its matters, and then aligned to specific procedures for producing data in line with the discipline and the research done by the rest of the seminar group (1997, 1998 cf. Chapter 7). On those findings, Prior concludes that: "literate activity created opportunity spaces within which sociological discourses and practices could be foregrounded and rehearsed" (1998, p. 244). Additionally, these findings "support a view of enculturation as a continuous, heterogeneous process of becoming" (p. 244).

### **Feedback on text**

Prior's studies illustrate scenes from education where students and teachers are closely involved in joint efforts. It is however more common that students are left on their own when it comes to resolving implicit, epistemological aspects of for example textual features (Blåsjö, 2011). From a social-semiotic horizon and with a particular interest in multimodality, Blåsjö has studied economics students and their curricular writing across three semesters. By using an ethnographically designed case study combined with the analyses of students' text documents, Blåsjö noticed that in their role as newcomers to economics, students focused on details in visual representations whereas "the hypothetical property of the visual tools of economics" (Ibid., p. 130) required struggling with mathematical procedures embedded in the presentation of a graph. The students in this study struggled with figuring out how mathematical procedures were part of practices within the field, such as hypothesizing to calculate future events.

Moreover, even though ethnomethodology does not study this type of struggle in terms of enculturation, it is interesting to discuss a series of such studies specifically interested in instruction of academic writing. Along such lines, Macbeth (2004, 2006, 2010) has pointed towards the "taken-for-granted-assumptions and competencies that underlie conventional objects" (2006, p. 180). Studying how newcomers to university education struggle to put generalized conventions for academic writing (e.g. *author*, *main idea*, *source*, or

*summary*) into use for summarizing a text, Macbeth found a series of what ethnomethodologists refer to as *occult objects* (p. 189) in the way explicit instructions for the assignment were followed through by the students. From the observation that there was a wide range of different ways the summary task was followed through, Macbeth argues that instructions need to be locally enacted to make sense for newcomers as “every specification will inevitably beg another” (p. 200). Secondly, as such local sites are in turn “tied to settings, tasks, and purposes that are neither fixed nor stable yet regular and recognizable” (p. 200), explicit instructions for the production of an academic text comprise “social arrangements, agreements, and cultural objects shared by a community of practitioners” (p. 200) that demand practical attention, and doing, in a student’s situation. Another important finding of this study was that following instructions involved competent judgment that seemed “to rest on understanding the relationship between the instructions and the outcome they promise, despite the fact that instructions are designed to *instruct* the project outcome” (p. 198).

Similar findings have also been made in a practice-based case study of peer interaction between Master’s students who were trying to make a teacher’s written comments to their developing text useful for revising the document (Jansson, 2006). Whereas Macbeth (2006) followed the challenges of using instructions in the form of writing guidelines, Jansson (2006) followed the challenges of implementing instructions in the form of written comments on a specific text. It was found that teachers’ comments were made comprehensible through a process where concrete response formulations were “extracted from the institutional frame, relocated and put into a new context” (p. 680) in order to fit the assignment. Firstly, the participants in Jansson’s study engaged in extensive recontextualization processes to reflect on and interpret comments with reference to conventions for writing. Instructions needed to be understood on the basis of their local situation. Secondly, studying precisely how comments were put into concrete use revealed that the work of recontextualizing instructions just as well as teacher comments was far from an abstract phenomenon, but consisted of practical work where conventions were negotiated as belonging to a larger framework and standard.

In terms of enculturation, these studies tell us that conventions for writing do not lend themselves to easy transfer but require introduction and guidance. On the contrary, these results imply that the situation of being a student

requires guidance about precisely *how* instructions can be used for improving texts. In the following, I will discuss findings from research that has more specifically asked questions about supervision as a means for such guidance.

## Guiding text production

Students and teachers working with academic writing have been in explicit focus in a few recent conversation analytic studies (Svinhufvud & Vehviläinen, 2013; Vehviläinen, 2009a). Investigating this type of guidance as critical feedback, Vehviläinen (2009a) found that text documents were treated as significant resources for anticipating necessary and subsequent steps in the students' work. On the basis of the current appearance of the text, the teachers launched a series of determined attempts to re-orient their students to steps that would be necessary to move the work forward. Even if the documents under discussion were not presented in the form of a report, Vehviläinen's analyses of verbal interaction shows that problems for the students are acknowledged and developed in terms of what the students' texts look like.

With regard to enculturation, findings like the ones in Blåsjö's (2011) study point out the significance for enculturation of coming into contact with how specialized terminology and disciplinary concepts are semiotically rich phenomena, and how they function in disciplinary settings, i.e. in concrete and situated circumstances. It was precisely in a contact space between everyday uses (and in a way the consumption) of graphs and the disciplinarily laden, epistemic practices for hypothesizing and making predictions about economics that a process of enculturation started. This was a situation where new possibilities had to be worked out. Lillejord and Dysthe (2008) used precisely such ideas about transformation and meaning-making at the intersection of what is known and what is new to discuss supervision and what they term learning practices around academic texts. In their study they report observations from two differently structured educational environments (designs) to discuss text-focused activities as sites for engaging with knowledge. One environment was campus-based, and here supervision of Master's degree students was provided by a team of teachers, in groups of several students at a time. The other environment was web-based and consisted of digital fora where text documents posted by students were discussed and commented on digitally. Across those environments, Lillejord

and Dysthe report that students' ways of working with and commenting on peers' texts had to be structured to promote what they call "active participation" (2008, p. 84). With an interest in supervision as a site for problem solving, and therefore interesting in its own right, they also found that students had access to "*divergent* voices" (ibid., p. 85). Through contributions by representatives from the research community and from their peers, they gradually changed their ways of commenting on others' documents: "This confrontation of opinions enabled students to critically reflect on the validity of each knowledge claim" (ibid., p. 85).

When conducting and investigating a sequence of group supervision conducted at the Master's level in Education, Samara (2006) found similar results; experiencing several perspectives made a difference in students' texts. In addition, as Lillejord and Dysthe's (2008) propositions were taken up as inspiration for the design and study of group supervision in a Danish context, similar findings were made (Nordentoft, Thomsen, & Wichmann-Hansen, 2012): "diversity and divergent voices are productive in academic learning" (p. 12). Furthermore, though, and beyond what Lillejord and Dysthe's (2008) study explicates, it is possible to assume that participation in 'critical reflection' was a practice that involved integrating opposing views and grounding one's own claims. In that case, supervision provided a way into a general form of reasoning that is common in academic texts.

The contribution of this study is that an orientation to learning can be staged through organizing supervision as a site where contradictions and opposing views are exposed and intersubjectively handled as part of local conditions. In other studies of supervision as a text-based, institutional practice (cf. Dysthe, 2002, 2012; Dysthe, Samara, & Westrheim, 2006), it was found that the significance of "exposing students to multiple perspectives is widely acknowledged in higher education" (Dysthe, 2012, p. 214) but that "it is left to the individual students to actively engage with the diverse voices in their writing" (ibid., p. 214). From interviews about specific textual practices employed in a set of distinct, disciplinary fields with faculty<sup>7</sup> responsible for supervising Master's students, Dysthe (2002) found three models for how supervision was conducted that reflected specific knowledge traditions of which the different faculty members were part. These included the teaching

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<sup>7</sup> The disciplinary fields were History of Religions, Administration and Organizational Science, plus Fishery and Marine Biology.

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model characterized by students' and teachers' "joint focus on effectiveness" (ibid., p. 518) in delivering a text; the partnership model characterized by joint and exploratory engagement in the project behind the text; and, the apprenticeship model characterized by immersion into practical work characteristic of experts in the field. From interviews, it was found that there were fairly close relationships between how faculty members described the characteristics of their field and the ways they conducted supervision. From a dialogical outset, Dysthe then makes the reflection that "[t]he supervisor's special task is at once to make his own voice clear and to listen to and revoice the voice of the student it is simultaneously to keep his own authority and identity and give authority and identity to the student" (ibid., p. 535). On the basis of collected results from the series of studies, Dysthe stresses that students' possibilities for developing knowledge is dependent on "joint activity and on the testing of divergent perspectives" (2012, p. 215) in interaction and through joint activity. Such findings highlight the complexity involved in academic text production and also emphasize the pedagogical problem of teaching the kind of transformation of knowledge that this type of text production involves.

In summary, questions about academic writing as a resource for studying at university have been approached from a broad spectrum of research perspectives. One reflection from this review is that studies of such processes as forms of enculturation have shown that enculturation is a complex process, shaped in relation to how situated conditions are established locally but contingent on much longer histories. Another reflection is that while research has shown that enculturation is a coordinating and open-ended process for students, this process has often been approached through tracing and interpreting steps of enculturation from series of texts or from students' and teachers' accounts of the process. It can also be noticed that supervision has been broadly investigated as a form of pedagogical and instructional practice, while its communicative, dialogical underpinnings as a sociocultural practice are less often focused in research.

By selecting an empirical site where an ongoing institutional practice of this kind is made observable, it is the ambition of this thesis to investigate a specific, but significant instance of what seems to be a long enculturation process. The supervision I study contains steps in a process of enculturation as students and scholars of a field interact around a series of drafts for an

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academic writing assignment. With a view to what challenges this text production process seem to involve for students as well as for teachers, it is the ambition of this thesis to make visible what concrete work early stages of this process imply. More precisely, I investigate an institutional practice where participants in supervision need to deal with challenges and demands related to disciplinarity.

# Chapter 3

## A theoretical approach to text production and enculturation

Sociocultural and dialogical perspectives on text and text production emphasize concrete situations localized in environments where texts function “as artifacts-in-activity” (Prior, 2006, p. 58) as an object for research. Any immediate situation where people produce texts, even as *lone writers*, is seen as part of a continuous flow of actions that over time shape traditions, discourses, institutions and knowledge. This chapter provides an account of the theoretical position and the conceptualizations that have guided my research towards exploring academic text production that introduces university students to knowledge traditions and epistemic practices. The chapter opens by introducing the concept of disciplinarity as a lens for theorizing disciplinary fields and their knowledge traditions in relation to text production and processes of learning. This leads to a theoretical account of how knowledge traditions are manifested and recognized as textual genres, where I introduce and make relevant the Vygotskian concepts of tools and mediation. The chapter then deals with the communicative and dialogical underpinnings of participation in text practices and with the forms of enculturation this perspective highlights. The final part of the chapter discusses supervision as a communicative practice and as the empirical instance for the study.

## Disciplinarity and academic text production

Sociocultural perspectives have largely converged on a view of disciplines as evolutionary, dynamically flexible and historically situated practices (Wertsch, 1991). For example, while regarded as a discipline, environmental engineering can be understood as a dispersed community, largely made up of contradictory practices and perspectives, populated by different types of agents with different motives and different discourses. What there is in terms of unity, however, is a historically and socially developed field where certain ways of knowing about societal problems are recognized and addressed in specific ways. Characteristically, there are questions about how societal challenges, such as sustainable development, can be met by policymaking and technological solutions. In a sociocultural perspective, environmental engineering can accordingly be understood as an example of an epistemological site with specific sets of problems, certain epistemic resources and particular processes of disciplinarity (Prior, 1998, 2006). This is a perspective that is in sharp contrast to views of disciplines as homogenous, solid and definable fields.

The concept of disciplinarity implies that fields are organized through knowledge traditions that are manifested through institutional and social practices. Knowledge-producing disciplines hold certain established discourses and textual forms for articulating, documenting and disseminating knowledge. Such forms of what Bakhtin termed *social languages* (Bakhtin, 1981) are sociohistorically evolved.

Producing a report as part of environmental engineering education therefore positions students in a *here and now* that is configured on knowledge traditions and practices that have a long history – i.e. traditions and practices that both precede and go beyond the immediate situation. More specifically, the situation of being a student, demands a certain degree of sensitivity to what characterizes the field in terms of disciplinarity.

Working with issues of sustainable development as a student thus implies sensitivity to what kinds of problems are dealt with in environmental engineering. This can involve certain ways of framing those problems as sustainability issues. It can also involve sensitivity to certain ways of creating data sets that can point towards precisely such issues. Recognizable and accountable ways of using such data can provide an argumentative foundation for making policy recommendations or suggesting technology solutions.



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Engaging with a disciplinary field as a student through texts and text production accordingly implies some participation in its epistemic practices (Arnseth & Säljö, 2007; Nerland, 2012; Säljö, 2012). This assumption is central to the thesis. It implies that producing a report as part of university education involves students in a process of aligning their emerging texts with disciplinary ways of reasoning, with particular discourses and with particular typified text patterns contingent on the discipline and its activities. In this sense, the practical work involved in encountering a discipline by producing text can be understood as a way of participating in what Prior (1998) termed a process of disciplinarity through text practices. Precisely how students are sensitized to disciplinarity is an interest that colours the empirical studies making up the second part of the thesis.

It is a basic premise of sociocultural perspectives that any form of participation in practices actualizes the concept of mediation (Säljö, 2005; Wertsch, 2007; Vygotsky, 1986, 1997). Mediation implies a process where cultural practices are both maintained and transformed through people who have developed and are also using various forms of tools.

The metaphor of tools was originally used in an analogy with reference to practical tools and devices in the service of human activity. The notion of mediation refers to their function as cultural resources, physical and symbolic, that people invent and draw on to solve problems and to pursue their activities (Wertsch, 1998; Vygotsky, 1997).

To follow Vygotsky's metaphor of tools and tool use with respect to sociohistorically developed ways of reasoning and arguing, tools on the one hand enable and facilitate participation in disciplinarity while they, on the other hand, also shape and structure that very same practice. In the setting of an academic writing assignment, this is precisely the reason why normative expectations of a certain genre, such as a report on sustainable development, can provide "frames for social action" (Bazerman, 1997b, p. 19) and thereby come to constitute tools in the Vygotskian sense. In this respect, sociocultural perspectives view typification and preservation of disciplinarity in discursive form as a time-transcending, sociocultural practice that is functional for our actions and for disciplinary life. Expectations of text types can accordingly be relied upon both in the situated processes of recognizing and understanding what others are saying (Volosinov, 1986) and of making things known to others. For example, Bazerman (1997b) refers to this structuring and complex role that texts can take as "the visible realization" (Ibid., p. 23) of social

dynamics and then addresses their function in situated use: "What we might feel as the weight of living up to the expectations of a particular genre is in fact rather the reminder of all the complexities at stake in the form" (Ibid., p. 23). In this thesis, I refer to such forms of visible realizations as *textual genres* and follow the Vygotskian concept of tools and tool use to account for their mediational function. In the situation of being newcomers to a field like environmental engineering, university students encounter textual genres that are already present in the field both through studying texts belonging to the field and through producing their own written assignments and other course work.

Whereas textual genres are historically and culturally embedded vehicles of disciplinarity at large and can help structure participation and action in the field, they also intervene with and transform practices as they are employed in situated circumstances. Vygotsky explains this in terms of fundamental transformations of people's orientations and actions to which the introduction of tools as mediational means into activities gives rise:

The inclusion of a tool in the behavioral process, first, sets to work a number of new functions connected with the use and control of the given tool; second, abolishes and makes unnecessary a number of natural processes, whose work is [now] done by the tool; third, modifies the course and the various aspects (intensity, duration, order, etc.) of all mental processes included in the instrumental act, replacing some functions with others, i.e., it recreates, reconstructs the whole structure of behavior just like a technical tool recreates the entire system of labor operations. (1997, p. 87)

Mediation accordingly refers to a fundamentally social process of development and transformation whereby we, as human beings, come into contact with and also establish our world through operating with symbolic means (i.e. tools and signs), such as language, counting practices and diagrams (Vygotsky, 1997, p. 85). Providing that textual genres in one sense can be understood as historically developed means for participation in epistemic practices, and as typified structures (objects) towards which such participation is directed, they simultaneously dictate the coordination and *modify the course* for how issues of this kind can be presented. This is how they simultaneously recreate and thereby shape people's participation.

Vygotsky referred to this dual function where tools intervene and change human activity at the same time as they shape and direct people's ways of acting in that activity as the *instrumental act* (Vygotsky, 1997). It is important to

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notice Vygotsky's emphasis on action with tools in activity rather than on tools themselves. His point is that as part of people's situated use, tools are constitutive of object-oriented meaning-making processes. Our insights get shaped by means of our encounters with tools and as we put them into use for some purpose or action. It is as part of situated action that disciplinary ways of reasoning and arguing can come to play a fundamental, transformational role in processes of enculturation and appropriation (Vygotsky, 1986). The question of how sociocultural perspectives view such processes by which people come to know is in other words closely related to interaction and participation in epistemic practices. In summary, this perspective views learning as a situated and fundamentally social activity, "emerging from challenges in situated activities" (Mäkitalo, 2012, p. 61) and characterized in terms of participants' joint coordination and meaning making.

The interest this thesis pursues lies precisely here, i.e. in the activities and challenges that emerge as people are introduced to and begin interacting with textual genres and discourses grounded in disciplinary traditions. This is an interest in how students who are relatively new to the field begin operating with "typified communicative practices" (Prior, 1998, p. 64) in the context of environmental engineering education. There is a material side to such epistemic practices that lends itself to concrete and material description such as instructions for what a text should look like. A sociocultural view, however, implies that precisely such concreteness and materiality has to be made sense of locally and be established by participants in activities where they engage with a practical task at hand. Engaging with issues of sustainable development as part of environmental engineering education accordingly involves a sensitizing process where students encounter disciplinary traditions and conventions.

### Encountering and participating in text practices

So far, three points have been made in this chapter. First of all, the thesis follows traditions that view texts as situated in sociocultural contexts. Secondly, in such perspectives texts and text practices simultaneously manifest the epistemological life of the discipline and function as constitutive for disciplinarity. Thirdly, producing texts directed at a discipline entails participating in disciplinarity through epistemologically-charged practices of the field. In the empirical studies of this thesis, students face a situation where

they study sustainable development by means of an assignment involving production of a report. As has been pointed out, such situations can be very demanding for the individual and require extensive communicative work. In the following, I will conceptualize such situations and processes further in the sociocultural and dialogical perspective developed in this thesis.

Another of Vygotsky's important points about tools is that we can use mediational means without necessarily having fully appropriated them, meaning that we can use them before we own them. For example, it is a feature of words that we can use them and try them as soon as we can say them - or write them - for that matter. A well-known example from Rommetveit (2003) can illustrate this possibility:

A woman who is a very knowledgeable amateur auto mechanic discovers that there is something wrong with the carburetor of her car. Her husband, who is notoriously ignorant about car engines and does not even know what a carburetor looks like, offers to drive the car to a garage to have it repaired. He tells the car mechanic at the garage, "There is apparently something wrong with the carburetor." This saves the latter considerable time in searching for the problem. (p. 214)

Rommetveit used this illustration to exemplify that meaning is not inherent in words themselves. His point is that in spite of different amounts of linguistic *shares* of a semantic field, it is possible for people to cooperate and carry out tasks successfully by means of using words. However, he continues, while the husband in this example could carry out the task of directing the attention to the carburettor in spite of limits in his knowledge of the function of the device, the mechanic is an indispensable co-author of the "linguistically mediated meaning" (p. 215), which can also be called the message (Rommetveit, 1974) in this situation. Such acts of understanding "must be accomplished by human actors whose minds are embedded within worlds of socioculturally appropriated knowledge and who operate in interactions with others and with situational conditions in their actual sense making" (Linell, 2003, p. 222). On the one hand, "forwarding words" (p. 221) in the manner of Rommetveit's example, enables action and participation. Understanding a word and using it, on the other hand, amounts to situating the word in a concrete context and as a particular utterance (Volosinov, 1986).

Producing a report for academic purposes is a concrete example of a situation where students encounter practices in which others are already speaking. Reading and working from course literature, scientific articles,

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lectures for one's own text production, implies beginning to use specific terminology, specific types of visualizations and features of discourses that in this situation stem from other people's texts. Implementing formulations from assignment instructions, prompted questions, or suggestions for headings can provide similar starting points. In a sociocultural and dialogical perspective, reproducing words of others is understood as a way of entering disciplinary conversations, i.e. as a concrete way of beginning to participate in a practice. Across the empirical studies, this question of in what ways people begin participating in disciplinary forms of life has been formulated as a matter of how access points to disciplinarity emerge in the interaction around students' texts. Employing words in substantial and meaningful manners is, as mentioned above, a very different matter requiring a process of appropriation, i.e. a process of making something one's own. Vygotsky, who paid particular attention to the developmental relation between thought and word, stated that:

The relation of thought to word is not a thing but a process, a continual movement back and forth from thought to word and from word to thought. In that process, the relation of thought to word undergoes changes that themselves may be regarded as development in the functional sense. Thought is not merely expressed in words; it comes into existence through them (1986, p. 218).

The key point to note is that, according to Vygotsky, words come to mean something as they are put into use. The challenges for newcomers to a field lie in this type of development and appropriation.

Appropriation (Bakhtin, 1981; Wertsch, 1998) concerns the concrete work of encountering and gradually making words and practices one's own. In the context of dealing with issues of sustainable development, appropriation can concern specific epistemic practices, i.e. how students begin using specific indicators to account for certain environmental problems or begin making certain types of observations of society. Accordingly, appropriation involves acting and speaking through specialized discourses to recognize and address certain kinds of problems for a sustainable future. With regard to conceptualizing participation in text practices, Wertsch (1998) has made an analytically useful distinction between mastery and appropriation. The distinction he refers to concerns knowing how to use a tool, or *mastery*, as somewhat different from making the tool *one's own*. With relevance for text production, one can test ways of reasoning and ways of using terminology.

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Sometimes those ways will be accepted by others, but occasionally they will also be contested and rejected - something that necessitates re-formulating the text and finding alternative ways of expression. As utterances are socially grounded in this way, individuals gradually sensitize themselves to specific ways with words typical of specific communities of practice. This kind of sensitizing process is an important element of enculturation and a process of appropriation.

However, and as pointed out by Wertsch (1998), appropriation in the Bakhtinian sense involves a different relationship, or degree of involvement, with tools. What Bakhtin refers to implies that discourses and scientific ways of reasoning are filled with others' intentions and that appropriation involves a process of *populating* the word (Bakhtin, 1981, p. 294). Appropriation means that one uses others' ways of reasoning and others' words innovatively for one's own purposes and intentions while still recognizing how they were used by others. Moreover, appropriation always involves resistance of some kind. As stated by Wertsch: "many words stubbornly resist' or 'put themselves in quotation marks against the will of the speaker'" (1998, p. 55). Regarded as a process, appropriation is considered arduous and demanding as people need to "take the word, and make it one's own" (Bakhtin, 1981, p. 294). This work involves comprehending others' speech and transforming others' speech for one's own intentions and aims:

Language is not a neutral medium that passes freely and easily into the private property of the speaker's intentions; it is populated – overpopulated – with the intentions of others. Expropriating it, forcing it to submit to one's own intentions and accents, is a difficult and complicated process (Bakhtin, 1981, p. 294).

Dealing with issues of sustainable development by producing an academic report is precisely such a situation where other speakers' intentions need to be taken into consideration. As has been mentioned, sustainable development is characterized by including social, technological, economic, ecological and political considerations. Different societal actors and stakeholders hold different views grounded in different interests. They therefore speak from different positions, with different intentions, and give voice to different attitudes towards sustainable development. Thus, the individual assignment I study provides an example of a situation where students need to find ways of dealing with a multitude of differing interests and their premises, or to borrow

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Bakhtin's (ibid.) way of expression: as populated language; and use them for their own purposes. This means that, their situation also involves appropriation in terms of how issues of sustainable development can be framed. As mentioned, there are typically certain initial resources for students to draw on for this work, such as instructions for the assignment and conventions for report documents in academic settings. However, appropriation involves dealing with those resources as contingent on knowledge traditions of the field and working out how they function as mediational means to address a particular audience. For instance, putting a list of general, conventional sections of report documents (like IMRaD<sup>8</sup>) or instructions for an assignment, into use can provide a starting point for developing a report document. In a sociocultural, dialogical perspective, the institutional practice I study is an instance where this process of gradual enculturation can begin. What the processes of coming to know involve, is a central question in the studies.

In a dialogical understanding of appropriation, it is precisely as part of individuals' interactions with practices in situated, local circumstances that conventions for report documents can become vehicles for disciplinarity. It is through use that tools become tool-like, i.e. they transform into mediational means that people can operate with creatively (Linell, 2009). Consequently, it is in local circumstances and situated sense making that conventions of writing and specialized terminology of a field can be recognized, negotiated and remade in relation to the experiences and expectations of students and teachers. As mentioned previously, the question of how initial access points are provided through supervision around students' text production is a general theme throughout the empirical studies in my thesis.

In summary, producing academic text as part of university education consists both of locally situated actions related to disciplinarity and discourses, and of a process of appropriation where discursive practices of the disciplinary knowledge traditions made one's own. More concretely put, while producing academic text typically involves reading and creatively using the accumulated knowledge of a field in its textual form, it also involves the shaping of one's own reasoning. In fact, a dialogical view holds that others' perspectives are an essential quality of speech in the sense that they give rise

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<sup>8</sup> The acronym IMRaD denotes a general structure of text sections for scientific papers: Introduction, Method, Results and Discussion.

to a process through which one's own utterance is attuned to, or resists, others' and their specific forms of reasoning and arguing. Viewed as a communicative process, what is interesting is how people develop ways of creating links between previous insights, and claims made on the basis of those insights, for their own use and for new situations. Accordingly, recontextualization plays an essential role in a process of coming to know, and therefore provides an analytical opening to investigate what such enculturation processes in terms of academic writing assignment involve.

### Supervision as an institutional, communicative practice

So far, this chapter has explained that viewing text production as part of disciplinarity implies an analytical interest in the situated actions by which people engage in epistemic practices. When supervision is introduced in the context of an academic writing assignment, it provides a conversational site where knowledge traditions can be explicitly introduced and attended to (Wertsch, 2007). As has been shown by Dysthe (2002), such traditions are put into play as part of the ways in which supervision is conducted. Supervision is an institutionally established, communicative practice in its own right. As will be discussed in this chapter, its specific interactions maintain institutional as well as interactional orders (Linell, 1998, 2010). In the following section, I describe how supervision has been approached as a communicative practice in the studies of this thesis.

### **The communicative dynamics of supervision around text**

Pragmatically, supervision marks a form of instructional practice that has a long tradition and can be found in many professional and educational settings. Even though it is beyond the scope of this thesis to trace its historical emergence as a form of teaching in educational settings, it is relevant for the studies in this thesis to regard its institutional embeddedness (Sarangi & Roberts, 1999), and its asymmetrical features in terms of participants' entitlements and obligations.

In sociocultural and dialogical perspectives, supervision is understood as a communicative practice (Linell, 1998) with institutional expectations (cf.



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Dysthe, 2002). Discursively it is premised on what has been termed institutional *frames* and discursive *ecologies* (Agar, 1985). This means that supervision marks an institutional activity where conversational parties, students and teachers, are directed towards work that has been done and work that remains to be done. In dialogical terms such institutional discourse is "designed to deal with some specific activity...with socio-historically sedimented routines" (Linell, 1998, pp. 240-241). Firstly, it is a conversation that takes place between different parties (i.e. students and teachers) with different entitlements and obligations in the practice. In institutional discourse, text and talk practices are directed at producing particular institutional outcomes. Supervision in educational settings can therefore be conceived as an institutionalized form of conversation with a purpose that involves certain conversational expectations and that reproduces an institutional order (Agar, 1985). The supervision studied here was directed at securing the progress and quality of student's work on issues of sustainable development.

Secondly, such activity-oriented expectations are visible in the interactional order of the supervision practice. Institutional roles are not seen as fixed and predetermined in the conversation; instead they are instantiated and maintained by the participants themselves as they orient to the activity. This means that their respective contributions to the activity are interactively and responsively established and maintained. It is as part of this interactional order that instances in student texts can become mediational resources through which knowledge traditions are attended to.

Consequently, and in terms of my empirical instance, supervision of text production is an example of a communicative practice centred on textual artefacts through which relations between what is visible in the text (words, diagrams, tables, headlines, bulleted lists) and disciplinary knowledge traditions can be established as part of the local interaction. Within a dialogical tradition this is referred to as "double dialogicality" (Linell, 1998, p. 132) of institutional practices; they are dialogical "both in the contexts of in situ interaction and within the sociocultural practices established over long traditions of indulging in such interactions" (p. 54). Having described the dynamism of supervision in general terms, it is time to look closer at how this communicative practice, as an empirical instance, can be analysed.

## Approaching the supervision practice dialogically

As explained, a dialogical perspective implies an analytical approach that gives priority to situated interaction as institutionally embedded and historically grounded. For the sake of clarification, I would like to stress that the term *dialogical* is an analytical term that refers to this approach, not to the circumstance that teachers and students are having a conversation. Also, in contrast to the type of ideal understandings of supervision that can be found in much literature on feedback and mentoring, a dialogical approach takes asymmetry in interaction as a premise. Alterity and heterogeneity are regarded as the basis of communication. Regarded as a communicative practice, supervision is seen as dependent on the inherent differences of the contributions of the parties involved. As texts are produced and used for particular purposes within different communicative practices, people "often read and use texts in ways that can only be understood as part of quite particular activities" (Linell, 2010, p. 54). The particular supervision practice that is investigated in this thesis is an example of precisely this - a setting where teachers and students interact with texts as "artifacts-in-activity" (Prior, 2006, p. 58). Furthermore, and as will be explained, a situated perspective gives priority to the study of participants and their interaction with mediational means in activities where they orient to, explicate and negotiate aspects of text production.

### **Analysing participants' concerns in communicative projects**

Analysing communicative practices entails approaching talk-in-interaction as participants' responsive acts. This means that the analytical work sets out from the participants' orientation to the specific orders and purpose of those actions, i.e. the participants' local interaction as part of situations that go beyond the immediate here and now. "What is being exchanged is not only words and discourse, but the worlds that make discourse" (Linell, 1998, p. 158). A dialogical perspective accordingly entails a communicative starting point to the study of what people are doing and what constitutes an activity for the participants. In this perspective interaction is analysed as reliant on

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embodied actions, symbols and artefacts used and produced as part of participants' joint coordination to the activity at hand.

Approaching supervision from the participants' perspective involves paying particular attention to how their concerns<sup>9</sup> develop in *communicative projects* (Linell, 1998). What Linell refers to is how interactants aim at "establishing an interpretation or shared understanding of something" (Ibid., p. 219) through coordination and collective management of understandings and misunderstandings as their conversation proceeds. The term 'concerns' as I have used it in the studies refers to instances in the interaction where the participants engage in a certain "communicative problem" (Ibid., p. 218). This means that they engage in local sense making to coordinate and establish a shared interpretation of what is going on in the interaction. Communicative projects are therefore observable as concerns emerge in interaction (Ibid., cf. especially Chapter 11). When such concerns arise in the supervision there is an episode of joint coordination and attention to the problem by both teacher and student.

While participants' concerns can be understood as communicative problems that arise as part of interaction, I would like to explain further how the concept of activity has been operationalized and approached in terms of discourse in this thesis. As described earlier, a sociocultural and dialogical perspective implies that people's immediate, *in situ* actions are socially embedded, mediated and contingent on history. Actions are not "entirely constituted on the spot, but they are re-created, re-produced, re-negotiated, re-conceptualized and re-contextualized in situ" (Ibid., p. 47). With regard to discourse, participants in activities deal with both the substantial, or topical, dimension of their own conversation and its sequential elements, i.e. its course of development and progression. This is why a study of supervision as a communicative practice offers rich possibilities to say something about what it involves to be encountering and engaging with disciplinary knowledge traditions by means of producing text.

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<sup>9</sup> Previously in this thesis I have used the term *challenges* to refer to what is here more precisely referred to in terms of *concerns* and *communicative problems*.

## Unit of analysis

Following the theoretical grounding as explained and described in this chapter, my interest in how people are sensitized to and engage with disciplinarity implies an analytical focus on an observable activity where they are interacting with mediational means to pursue such tasks. Additionally, adopting a stance towards practice that so essentially prioritizes communicative aspects requires possibilities to follow interaction in detail to analyse how tensions in terms of participants' concerns are established and develop as communicative projects. Furthermore, to be able to say something about the challenges involved as people encounter and engage in knowledge traditions that are new to them by means of producing text, the analytical work should approach such instances in the interaction where concerns emerge, and follow them as epistemic practices sensitive to issues of disciplinarity. From an interest in the challenges involved as people encounter and engage with knowledge traditions, my unit of analysis therefore demands forms of empirical data where such instances in interaction are open to observation.

## Research questions

As has been pointed out, this thesis takes as its point of departure that texts and text production constitute significant parts of how disciplinary life is maintained and reproduced. At the same time as text production offers access to ways of being and reasoning that constitute the discipline, this process provides powerful mediational tools for engaging with disciplinarity. By engaging with text production in the form of a report, students encounter epistemic practices through specific ways of reasoning and arguing that constitute the field.

While other research has documented interrelationships between engagement in text production and enculturation into disciplinary fields, my interest concerns the concrete question of *how* access to disciplinarity is provided through text production. Enculturation to a professional field through texts seems to be a common and practical problem in a number of professional domains, such as law, health care and education. I have attempted to study processes of this kind by analysing an institutional communicative practice where engineering students are guided into issues of sustainable development through text production.

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First, it is an important premise for this thesis that engaging with disciplinarity through a textual process can be seen as the beginning of a process of enculturation. In the setting of higher education, this type of process is characterized by important interdependencies between students and teacher. In the context of a writing assignment, students' texts constitute an element for displaying the status of what a student is capable of, and a means for guiding the progression of the students' work. At initial stages of encounters with disciplinary knowledge traditions, students need to be provided with means to access disciplinarity and to begin working along disciplinary knowledge traditions. Even though students' encounters with disciplinarity through individual writing assignments can be scaffolded by assignment instructions, descriptions of conventions for report documents, and guidelines for text types and textual genres, their situated function for the production of text in specific, local circumstances has to be worked out. Partly, this involves how such conventions are manifested by textual genres and knowledge processes within the field. Therefore, the students' drafts constitute primary resources for beginning a process of enculturation. The following question directs the analytical work of investigating what access points to issues of sustainable development that emerge in relation to the text drafts as they are brought into supervision:

1. How are the students' text drafts attended to as part of the supervision?

Another problem for the students involves dealing with the knowledge that is already there in the field and becoming familiar with how traditions emerge from texts that are used and recycled. Across the three empirical studies, I address this matter as a question of how disciplinary ways of producing knowledge, which I have referred to as epistemic practices, are introduced and made comprehensible to students. On the one hand, students of a field encounter and are in need of using a series of disciplinary means such as procedures, concepts, terminology and argumentative practices that are new to them and therefore require guidance. On the other hand, using such means demands sensitivity to the discursive and semiotic dimensions of precisely those procedures, concepts and practices. Even though students can initially be able to use a certain term or perform certain actions that are characteristic of a practice, accomplishing such actions on one's own and employing them

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competently involves being sensitized to their semiotic functions and use in practices. This tension is investigated through the following question:

2. What ways of framing, employing and responding to issues of sustainable development are introduced and dealt with?

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## Research design

Following the description of the theoretical grounding and the analytical outset for the thesis, it is time to describe the research site and the empirical material in more detail. The site I studied was organized around an academic writing assignment in environmental engineering education. The assignment was launched as a major means of instruction in a Master's degree module focusing on sustainability assessment and which concerned issues of sustainable development. While the module was provided as part of an environmental engineering degree for international students at a Swedish institute of technology, the academic writing assignment *per se* can be viewed as an example of a pedagogical situation that seems to be increasingly common in higher education. This chapter opens by introducing the empirical site, contextualising the assignment that students and teachers are working with and describing how the supervision setup was organized. Secondly, it describes the empirical data and discusses the practical arrangements for making video recordings. The analytical procedures are also discussed with regard to the transcriptional work and the analytical investigation of interaction. Finally, the chapter discusses the procedures for selecting empirical examples to report the results of the analyses that were pursued in the empirical studies.

### Introduction to the empirical site

The three studies that make up the thesis originate from substantial empirical fieldwork that was carried out in the autumn of 2007. At that point, all pedagogical events of an introductory, seven-week-long environmental engineering module for new Master's level students were followed ethnographically and documented by video. Apart from providing students

with lectures and seminars intended to scaffold their work around sustainability assessment and environmental issues, this module involved work with an extensive, individual academic writing assignment around which each student spent five weeks exploring a sustainability problem. The empirical site for the three studies consists of a series of compulsory supervision sessions organized as support for this academic writing assignment that eventually took the concrete, textual form of a report.

The body of informants consisted of 14 students and 3 teachers. The student body was international and the individuals came from six various language backgrounds. Everyone had completed undergraduate studies in science and/or technology and then applied to the Swedish institute of technology to study for an MSc/Eng degree. The teachers came from two different language backgrounds, and from different experiences of teaching. They shared Environmental Systems Analysis as their field of expertise. In accordance with the university's policy and general recommendations for education at Master's level across Europe, all teaching and course work was conducted in English. Therefore, the participants' talk could be transcribed without translation into English.

### **The academic writing assignment and its organization**

The academic writing assignment was launched under the specific term *report* and consisted of 14 different issues of sustainable development, called *title subjects* in the students' instructions. It can be noted that a report is a specific literate product in the sense that it summarizes data and insights, analyses those and makes suggestions about something. This implies a concrete question to be answered in order to be able to intervene in some process or to recommend remedial actions for sustainable development. It was an explicit aim of the assignments that the texts should cover a series of specific sustainability issues as well as assessment methods or specific indicators by which environmental measurements or other observations could indicate a "temporal trend of an environmental problem or aspect of sustainable development" (p. 1 in the assignment description, see Appendix 1). Sustainability was framed as reliant on different and partly contradictory perspectives (such as ecological, social, political and economic considerations), different values and attitudes towards for example risk-taking, that were to be



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dealt with and discussed within the papers. The report assignment also included giving "a recommendation that reflects your own opinion based on the analysis and conclusions of your text" (see p. 2 in the assignment description, Appendix 1)

Each assignment was presented in written form, framed by an overarching question or statement, a brief presentation of the subject, and a list of suggested literature. Regarded as sociocultural objects, the individual assignments contained several kinds of elements that had to be worked out so that environmental engineering and its knowledge traditions could be made comprehensible. Regardless of subject, all assignments involved a literature study of one specific environmental concern, such as the relationship between international trade and sustainable development, between energy consumption and sustainability and so forth.

The writing assignment was introduced to the students during a seminar the teachers designed especially for this purpose. Following an introduction of each *title subject* (see Appendix) provided by the different teachers, all students selected one subject of their own interest from the collection of assignments. While the assignment was organized as individual work over a period of five weeks, it also included compulsory supervision sessions before submission of a final version. The responsibilities for supervising the assignments were distributed across the team of teachers, and each teacher followed four or five assignments.

### **The supervision sessions and their sequential organisation**

The supervision was organized as an individual meeting between a student and the teacher responsible for the specific subject this student was working with. As an institutional encounter, in the sociocultural sense (Mäkitalo & Säljö, 2002), such a situation can be regarded as charged with a set of expectations and specific obligations for both parties. With reference to what was explained in Chapter 3, this is a situation where teachers are responsible for providing means that can secure a progression for the student's work. Such a responsibility involves anticipating the individual students' next steps forward on the basis of their text. For students, an individual talk with a teacher can turn into a meeting where they are held responsible and made accountable for both their work so far and the quality of the text.

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In the setting studied, supervision was a recurring event for the participants. There were two scheduled compulsory supervision sessions for each title subject, but in six of the cases I also documented a third meeting that took place on the students' initiative. The overview of the data provided in Table 1 shows the distribution of supervision sessions across the individual assignments.

Students routinely submitted their text drafts a few days in advance of a supervision session, to allow some time for the teachers to read and prepare comments. During supervision, teachers then took on a role where they used the student text as a base line for guiding the student's prospective work. Accordingly, and regarded as a research site, the studied supervision provided a setting where the student texts were considered as students' major contributions to the activity and where the talk was driven by those text drafts.

While text documents have been noted for their structuring function of supervision (Svinhufvud & Vehviläinen, 2013; Vehviläinen, 2009a, 2009b, 2012), the supervision studied here was also characterized by other types of textual objects that were routinely played out in relation to the drafts. These types of texts were the written instructions for the different assignments but also annotations and notes made on students' text in advance of the sessions as well as during supervision. Additionally, teachers occasionally produced sketches during the meeting.

The first supervision session was organized as a meeting around early drafts of the students' texts. It was scheduled approximately one week into the course of the assignment and concerned preliminary ideas for the report document. As such, this particular supervision session was critical in terms of providing access to environmental engineering as a field and its knowledge – something that provided valuable material for Study 1. The documents submitted for this session were termed *outlines* in the participants' jargon. All 14 sessions that took place at this stage were documented.

The second supervision was organized as meetings around what was termed draft versions of the report. As they took place a few weeks into the module, this was a stage where the student texts were longer and treated as more substantial contributions. As can be seen from the overview of data in Table 1, these sessions generally lasted longer than the first sessions. As a general instance, the second supervision session can be characterized in terms

of its focus on what the students had produced so far, and on what steps and measures would be necessary to complete the assignment in the expected way and within the given time frame. Thirteen sessions were documented.

The third supervision session took the form of unscheduled meetings requested on short notice by the students. Even though the text drafts discussed here were not always submitted in advance of supervision they were consistently used as the talk's point of departure. The empirical material contains six sessions at this stage of the students' work.

### Access to the site and ethical considerations

Gaining access to a site like individual supervision can be problematic due to the privacy such meetings can imply. In my case, preliminary access to the entire pedagogical module followed after a meeting with the teaching team that was the result of a personal invitation from the teacher in charge of the module in the spring of 2007. After this, I was invited to observe meetings that took place during the spring and summer during which the teaching team planned the module. In a meeting just before the start of the module in the early autumn, we discussed in what way the students could be introduced to my study and especially to the idea of video recording their work.

After having been presented and having met the students in their first session of the module, I introduced the research project in the following session. I informed the students and teachers personally of the study and through a written description. I emphasized that the research was not part of the course work the students were expected to carry out, nor would the material be included in the assessment of their work but would only be used for research purposes. For confidentiality, the collected material would not be used in settings where the informants could be recognized, and their right to be anonymous would be protected. I described my own role as an observer and the procedures for recording. Finally, I also explained that as informants, students and teachers would have access to their own material both during the time it was collected and afterwards. After this, I was granted permission to begin documenting all work carried out in the module by video and field observations. As a result, the empirical material consists of a large, mixed corpus from which supervision was later singled out.

In contrast to studies of settings that are specifically organized for research purposes, one very important advantage of this study was that the studied

events were part of the regular curricular events. However, such an empirical advantage also means that there is a risk that personally impinging situations on the informants' part will get documented. Therefore, it was necessary that all informants were given the right to decline participation in the study at any point during the fieldwork period. On the other hand, as a researcher pursuing an initially very open observation, I also found myself in an open and uncertain situation regarding what kind of material and what part of the module that would be most interesting to the analytical work. Initially, my idea was to follow a setting where academic writing was used as a pedagogical resource and a form of instruction.

Furthermore, because it was important to me that all informants knew what kind of material to which they would be granting access, I asked for their final consent to use the empirical material at the very end of the fieldwork, i.e. on the students' completion of the seven-week-module. At this point, the informants were able to survey the complete series of events that had been documented by video and understand what other material I had collected. At this point, all informants – both students and teachers - gave their written consent to using the collected material in its entirety. By means of this procedure, participants were informed about the research and its effects, and were also able to freely decide whether they wished to participate.

Ethical considerations concerning confidentiality have been made in relation to the rules and guidelines provided by the Swedish research council (Centre for Research Ethics & Bioethics, 2013). With regard to video data, these guidelines need specific attention, especially in the publication of the research. Confidentiality has been secured to the extent that faces and names have been anonymized in the published articles, or else specific consent has been granted<sup>10</sup>. Prior to giving their written consent, the participants were informed that it would be necessary to show the material in research settings and that they as individuals would of course always be identifiable to other members of the group of informants.

## The empirical material

Video data offer unique opportunities to document details of ordinary situations as they can provide rich texture for people's situated activity and

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<sup>10</sup> The video submitted as supplementary data for Study 3 was granted such special permission.

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interaction. Capturing interaction in this manner not only offers documentation of the physical place where students and teachers work, but also makes it possible to revisit the activities and observe them in detail. Capturing the employment of artefacts is especially valuable, and in fact necessary (Prior & Hengst, 2010), when attending to the semiotics of the communicative practice and its multimodality. For the studies in this thesis, it was also important to access the students' and teachers' sustained interaction with environmental engineering as a field. Working from video data provided such a possibility as well as an opportunity for close observation of how textual artefacts and their specific features were brought in as mediational resources. As mentioned before, it is only in interaction that mediation is observable (Wertsch, 1998).

Moreover, video data make it possible to revisit each individual session many times, thereby gradually creating a more detailed description of activities in which the participants were engaged. Approaching the dialogue also requires possibilities to follow interaction in detail through the participants' talk as well as through their gazing, gesturing, pointing and other physical expressions (Heath & Hindmarsh, 2002). Overall, analysing local sense-making and how communicative tensions and participants' concerns develop through communicative projects is greatly facilitated by rich, on-site data of the kind that can be provided by video material.

Recording ordinary situations as they occur naturally raises the issue of how a camera and a researcher might affect and impact participants' conduct, the setting being researched and in this case the interaction. Literature like Heath, Hindmarsh and Luff (2010) suggests that this, however, is an empirical question that should be determined in its own right on the basis of the material collected. After scrutinizing the material for other purposes, I can say that there are a few occasions where the participants in the supervision noticed the camera and the recording procedure explicitly. It was not within the scope of this study to record when the camera was noticed but one general observation was that the supervision practice and the business at hand for the participants took the attention away from the recording. While other recent video-based studies (cf. Heath et al., 2010; Lindwall, 2008; Lymer, 2010) have noticed the similar thing, I would like to make the comment that bringing a camera to an empirical site can of course always affect the situation, the empirical material and the results. One general observation made through informal conversations and the ethnographical fieldwork was that teachers

and students were very aware of the recording as it happened at all the events of the module. The one-to-one supervision encounter may potentially be more face-threatening than a group seminar or lecture setting. Even so, as I talked informally with the students in the corridor outside the supervision rooms, they generally said they had paid little or no attention to the ongoing recording. In fact, on one occasion a student even approached me to ask why I had not been recording his session and he was clearly surprised to find that the camera was there all along. Together with my general observations from outside the supervision rooms, this testifies to the overall tolerant and open attitude to the recording that the participants seemed to share. Another testimony of this is of course that I was allowed to use the recorded material without exceptions.

### **Data production: recording and collecting artefacts**

The supervision sessions took place in the teachers' offices or in small, adjacent seminar rooms. The participants usually sat at a table where they spread out texts and other material as the sessions began (see Figure 1 below for an illustration). To capture the interaction, one video camera was mounted on a tripod and positioned so as to capture the participants' physical orientation to and use of documents as they were discussed.



Figure 1: Examples of camera view points

Working in a small room meant that the camera was more physically present in those sessions than it might be in lectures or group discussions. As Supervision Sessions 1 and 2 were scheduled events where three parallel sessions took place simultaneously, I was able to prepare and set up cameras in each room in advance of the sessions. The recording was usually started by me, but I routinely left the room and the camera running after saying hello to the teacher and the student. This was partly for practical reasons because I managed the recording in all rooms on my own, but it should also be noted

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that it was a decision that to some extent affected the empirical work. One limitation this has brought about is that the camera angle does not always allow for a completely clear view of what it is that students and teachers write or produce during the sessions. However, in most cases it was possible to compare the draft documents and various notes from each session in relation to the video recording and trace what had been written or scribbled down. Another consequence was that the supervision setting was a site I approached from backstage, so to speak. Working ethnographically, I had observed the students as they came and left supervision and the teachers as they prepared, set up and followed up the sessions. But, as I was not present during the actual supervision, my first encounter with this site was through the documented material.

However, in spite of the routine of leaving the participants and the camera there were a few occasions during the third supervision sessions when I was present in the room during supervision. One reason why the arrangement turned out this way was that those meetings sometimes took place on short notice and there was not enough time to set up the camera. Another reason was that the teacher had set up the rooms differently so that teacher and student sat side by side and sometimes also facing a computer screen. As it was impossible to capture the participants' faces in those situations, I chose to position the camera behind the participants. One advantage of being present in the room was that I was able to zoom in to capture details as annotations were done on students' drafts. The figure below shows an example of this.

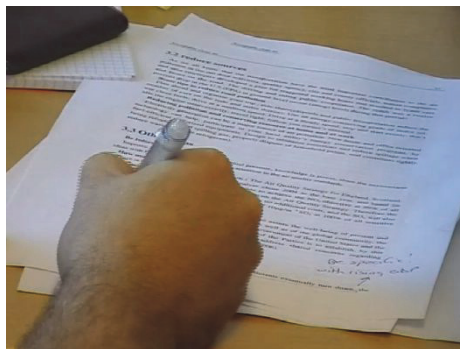


Figure 2: Capturing details, cf. Study 3

Each session was recorded on a separate tape. All tapes were digitalized a few days after the recording. This work required particular software expertise and

most of the digitalization was carried out by helpful colleagues specialised and experienced in the required software and technology. After the digitalization, each tape was labelled and stored in a fireproof room. The digital files were transferred to separate extension disks. From those hard drives, I transcribed each tape roughly in order to produce a first thematic overview of the sequential activities pursued within the supervision sessions. The rough transcripts were saved as separate files and also documented on paper. The student drafts were collected from a digital learning platform as they were submitted in advance of the supervision sessions. As regards the documented third supervision sessions, I collected the written material on site and asked for permission to make copies then and there.

### **Overview of data**

Table 1 below (i.e. on the following page) provides an overview of the collection of video data used for the studies. As can be seen, the collection consists of 33 recorded supervision sessions distributed across 14 subject themes and students, 3 teachers and 3 supervision sessions. About 20 hours of the transcribed video recordings were collected in the supervision setting<sup>11</sup>.

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<sup>11</sup> A substantially larger empirical material documenting the entire engineering module, including most of the scheduled events of the module and not just the supervision sessions, was transcribed as part of the initial analytical procedures. This material was used as a basis for selecting a focus for the studies included in the thesis, and the supervision sessions became this selected focus.



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Table 1: Overview of collected video material used in the studies

			Video data in minutes		
Case	Title subject (as phrased in the assignments)	Teacher	Superv. 1	Superv. 2	Superv. 3
1	Population: boon or boom?	(A)	16:30	26	
2	What are the constraints of a sustainable energy future?	(A)	22:30	44:45	
3	Towards sustainable consumption	(A)	23:30	49:30	12
4	Acceptably clean air	(A)	18	53	35:30
5	What does sustainability mean for future transport?	(A)	36		
6	Food and land-use: will there be enough land to feed our children?	(B)	29:45	42	30
7	Are present marine fisheries sustainable?	(B)	17	27:30	
8	Are the present patterns of production sustainable?	(B)	34	26:30	
9	Will there be enough water?	(C)	44:15	61	
10	Is democracy necessarily a part of Sustainable Development?	(C)	41:30	49	62
11	Is trade always good?	(C)	47:15	56	
12	How are urban physical structures and sustainability linked?	(C)	55	59	61:45
13	How is national sustainability assessments performed?	(B)	28:45	32:30	10
14	How is sustainability assessments performed at the city/municipal level?	(B)	15	21:15	
<b>Total</b>			<b>429:00</b>	<b>548</b>	<b>211:15</b>
	<b>approx. 1, 188 minutes</b>				

### Decisions made in relation to the data

The kind of data I have used provides access to a number of other interesting phenomena than the ones I have chosen to study. This is of course not at all

unusual with rich ethnographic data. However, I would like to mention a few central features and how they probably influenced my analytic work.

As mentioned previously, the group of Master's students that I followed was international, representing seven nationalities. There were two different nationalities within the teaching team. In line with the Bologna directives, all teaching and instruction was carried out in English. This means that all participants except one teacher were working in a second or third language. Such a setting would of course provide a lot of interesting observations from the perspectives of English for Specific Purposes or academic writing in English as a second language. But, this is not my focus in the analyses. Still, and drawing from my personal background as a practising junior engineer, upper secondary school teacher, and my current experiences from several years as a teacher of academic and technical communication, the participants' command of English has consequences for the conversations that I analyse. For example, it is clear that the participants have to work around vocabulary problems. New terminology might cause other problems in this setting than in a monolingual one. It is also clear that the participants draw on other resources than purely linguistic ones simply because they operate in a foreign language. Deictic expressions (this, that, those, etcetera) and gestures are sometimes very frequent. Given that conversationalists display and confirm that they follow each other, it also seems likely that eye contact, pointing and other bodily gestures are more frequent in these tutorials than in a monolingual setting. A recent study by Majlesi, shows that gestures can indicate and compensate for word-finding problems (2014).

Another factor that can affect the analysis of the data is the students' different educational backgrounds. All of them have a technical or science background, but they come from different disciplinary fields, for example biology, mechanical engineering and civil engineering. Therefore, they probably draw on different disciplinary backgrounds as they engage with the issues of sustainable development and the writing assignment. This stands out in relation to how the students anticipate the ways to carry out their individual *title subjects* and it seems, at least to some extent, that this played a role in the decision on which *title subject* each student chose to work. Their previous experiences of producing reports and other papers for academic purposes probably also play a significant role in how these students strategically handle the compulsory outline and drafts. However, given the sociocultural and dialogical perspective outlined in Chapter 3, this would be an empirical

question rather than a matter of following for example what type of academic writing skills transfer between assignments and settings.

### **Initial analytical procedures**

Video data might still be a little extraordinary in research traditions that take an interest in text production as a process of approaching a new field, but it is essential for an empirical exploration of academic writing as situated practice and semiotic activity. As "people are never just talking, just reading, just writing" (Prior & Hengst, 2010, p. 19) but simultaneously using different modes and means for expression while engaged in interaction, analytical attention to discourse and communication requires some way of observing details. The critical matter for an empirical analysis of this kind is of course how talk-around-text data can be made useful for approaching specific aspects of students' text production as situated activity. Following traditions of analysing interaction, the empirical work was concerned with "ways in which the production and interpretation of action relies upon a variety of resources - spoken, bodily and of course material resources, such as objects, texts, tools, technologies and the like"(Heath & Hindmarsh, 2002, p. 3) (cf. also Heath et al., 2010; Leander & Prior, 2004).

As has been mentioned, video data is essential for taking the type of participant perspective that is significant for this thesis. To clarify, studying practices as situated implies approaching the action from those involved and approaching interaction as it occurs to the participants. To study action from the perspective of those involved in the action is in other words a methodological consequence of an interest in situated practices (Heath et al., 2010; Jordan & Henderson, 1995). In my studies, video recordings and the participants' use of texts have been the prime resources by which I follow how the participants orient to their joint activities. I have done this by identifying their communicative concerns in interaction, and by analysing utterances with a view to their communicative function as responses and uptakes (Linell, 1998). However, as the general theoretical picture has been presented in the previous chapter, the sections below report the analytical procedures with a view to specific considerations made in relation to the empirical studies.

## **The work of transcribing**

My transcription work can be described as an iterative process where more details were gradually added to the data. I have worked on my own, and the data have also been discussed and collaboratively worked with in several expert seminars and workshops especially designed for such analytical purposes, and at all stages of the empirical work. Throughout the work with this thesis, such seminars have also functioned as fora where empirical findings could be validated.

The very first phase of data analysis was a content log (Jordan & Henderson, 1995) carried out as a sometimes rough but mostly word-for-word transcription to identify typical conversational topics across all 33 sessions in the supervision data. Already at that stage of the analysis there were certain conversational themes found throughout the data, meaning that many examples of similar events occurred across the 33 sessions. Some of these themes seemed particularly interesting to pursue further. These included the confusion around the process of producing a report document vs. the process of carrying out a study to be reported for academic purposes; how to take other literature on board for the purposes of writing about one's own subject; and how to reason and argue for the purpose of shaping claims that would be functional for an environmental issue in an engineering situation. Those themes were logged in the video transcripts and documented on paper in the form of an overview of recurring themes across the supervision sequence.

Guided by those overall themes, the second phase of the analytical work involved mapping instances similar to those themes across all 33 sessions in more detail by means of further transcription. This stage involved developing separate overviews for the different studies by following the participants' concerns and communicative projects by means of more detailed transcription. These overviews of the material provided significant entrance points to further analytical work in terms of the research questions posed and were also a help in the selection of specific episodes for the production of the articles. Here, a third stage of transcribing took place as specific episodes in the data had been selected. The transcription at this stage operated at the discursive and semiotic level of the interaction, to generate a substantial and significantly detailed view of what activities the participants engaged in.

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I would like to make explicit that transcribing was a method for working with the data and getting close to the interaction. The actual analysis was performed on the video-recorded material and the textual artefacts put into play by the participants as part of their activities - not the transcripts. Accordingly, the transcripts produced as part of the empirical work can be understood as support for scrutinizing the video data, or as Lindwall expresses this: as "an indexical surface pointing back to the video" (2008, p. 68). The time invested in transcribing during this thesis project is ample and only a small portion of the data analysed in the empirical studies has been selected for the articles due to limitations of space.

### **Selection of activities for the empirical studies**

As has been explained, the empirical work was based on the video-recorded material as a whole, but given the previously explained interest in text production and processes of coming to know as situated, as communication and sense-making, it is necessary to observe discourse closely and in detail. Accordingly, and in order to manage such empirical work, it is necessary to select rich and representative examples to capture not just words but also intonation, emphases, pauses, gestures, gaze, postures and the use of artefacts. The representativity of the selected examples is commented in each of the studies (see Chapter 5).

The material specifically analysed in the separate studies is specified below. The student drafts and other textual artefacts used and produced in the supervision sessions have been included in the analytical work to the extent that the participants themselves oriented to those artefacts as resources in the supervision.

**Study 1** *Supervision at the outline stage: Introducing and encountering issues of sustainable development through academic writing assignments*

#### **Data material:**

Video recordings from all Supervision Sessions 1: 14 sessions, 429 minutes. Students' outline documents, notes and annotated versions of the documents. Episodes from Cases 4 and 11 selected for the article

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**Study 2** *Referencing as practice: learning to write and reason with other people's texts in environmental engineering education*

**Data material:**

Video recordings from all supervision sessions across the module: 33 sessions, 1,188 minutes. Students' drafts, notes and annotated versions of the documents. One longer episode from Case 12 selected for the article.

**Study 3** *Reaching conclusions in academic papers: the rhetorical work of designing claims in environmental engineering education*

**Data material:**

Video recordings from all supervision sessions across the module: 33 sessions, 1,188 minutes. Students' drafts, notes and annotated versions of the documents. Episodes from Cases 4 and 13 selected for the article.

# Chapter 5

## Summary of the empirical studies

This chapter summarizes each study with a view to its specific focus, main findings and arguments as those were presented in the respective article. The three articles that report the empirical studies can be found in Part 2.

### Study 1

#### Supervision at the outline stage: introducing and encountering issues of sustainable development through academic writing assignments.

Eriksson, A-M., Mäkitalo, Å. (revised and submitted manuscript)

Stepping into disciplinary knowledge domains implies appropriating certain ways of framing issues, of grounding arguments, and, of making relevant knowledge claims, i.e. epistemic practices. The initial stages of producing a report as part of studying at university therefore entail a situation where specific, and disciplinary, epistemic practices need to be made accessible and comprehensible to students. Study 1 thematized how initial starting points for engaging with such practices were introduced and undertaken as part of supervision and by means of dealing with students' early and preliminary texts for the academic writing assignment, so called *outlines*. The production of an outline implies a situation where students operationalize for example

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instructions for their assignment with limited experience of how those instructions are contingent on knowledge traditions of the field. For teachers, this early stage is a situation where students need to be provided with means for accessing knowledge and knowledge traditions of the field. This tension was addressed by analysing the first supervision session of 14 cases on the basis of the following questions:

- How were the students' outline documents used as access points for writing a report in the field of environmental systems analysis?
- What key elements of this particular genre were introduced as mediating means to engage with issues of sustainable development?

While mediation was the analytical focus for Study 1, its theme emerged from an interest in supervision as an institutional and communicative practice where students' work is at stake and becomes a joint concern for the two participating parties, i.e. students and teachers. Accordingly, the first step of the empirical work implied scrutinizing all outline sessions in order to create an overview of recurring communicative activities and epistemic concerns across the 14 cases. Secondly, two cases were singled out for detailed analysis of the situated and interactional work. They addressed the same kind of typical concerns, but attended to those concerns through different mediational means. Thirdly, on the basis of detailed transcriptional work, five episodes were then selected from these two cases. As a selected set, these episodes demonstrate how issues of sustainable development were introduced at this early stage of producing a report.

The results from the cross-case analysis made visible recurring activities and epistemic concerns in these outline sessions. During an opening agenda-setting activity the function of the outline documents was typically oriented to. Another typical activity was to make salient a clear distinction between the product and the process of the writing assignment. Thirdly, specific ways of converting the topics specified in the assignments into issues were attended to as activities of arguing. Lastly, the sessions typically closed with an activity of planning the next step of the work by orienting to future commitments.

The analysis of these recurring activities as epistemic concerns first showed that orienting towards the function of the outline included a very important point concerning outlining as an activity. Here, the students' texts were



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elaborated both as a means of organizing a report-in-the-making and as a means of conducting a study of an issue of sustainable development. Precisely how outlining was a method for coming to grips with the kind of work the writing assignment involved was clarified in terms of actions. For example, terminology typical for academic writing and report documents, for instance *aim* and *method*, came to function as mediational means for introducing conventions of academic texts. They were also reformulated and operationalized as elements for engaging with assignments of this kind. As a result, this example shows how the outline document is used for introducing relevant academic writing conventions and for presenting how such conventions could be understood.

Secondly, it was found that the consequences of this distinction had to be clarified further for the student. For instance, as the instructions for the individual assignments typically included a series of questions, those questions frequently recurred in some form in the outline documents. We found that students oriented towards those questions as concrete pointers for what information to find and include in their texts as well as for structuring the contents of their reports. As it was probably too early to use the questions as explicit cues at this early stage in the work with an issue, the teachers elaborated the questions as specific types of actions for the students to engage in. Orienting towards the questions in this manner was a way of establishing an approach to issues of sustainable development by dealing with knowledge in the field.

Thirdly, by means of exploring five episodes in detail, we investigated how several key elements for this approach were introduced and interactionally established as forms of meaning making and elaborated as practices. First, it was found that the concept of a model was introduced as an analytical approach for shaping specific issues of sustainable development. Second, the concept of a comparison was introduced as a concrete starting point for turning the assignment into a study. Third, the concept of a trend was introduced as a means for reasoning about issues of sustainable development and for making claims. On the one hand, these practices implied concrete ways of approaching and dealing with specific problems and interests of the field. On the other hand, these practices entailed engagement with epistemologies and knowledge traditions of the field.

It was concluded from this study that outlining implies that argumentative functions of typified practices of the disciplinary field were introduced to

students at an early stage of enculturation. As part of supervision, outlining was introduced as an organizing activity for performing, establishing and presenting issues of sustainable development. Supervision provided a situation where the cultural embedding of knowledge and specific epistemic practices could be introduced and interactively oriented to in relation to the material form of students' outline documents. In other words, the results of this study suggests that advanced literacy processes like the ones involved in this academic writing assignment do not happen automatically and spontaneously from instructions per se for students. While instructions in text are important resources to introduce outlines, their functions for working with an issue of sustainable development have to be introduced as well as interactionally established. Supervision provided precisely such a communicative event where the rich flavour of genre and disciplinarity could be explored in concrete ways and in terms of specific actions.

## Study 2

### Referencing as practice: learning to write and reason with other people's texts in environmental engineering education

Eriksson, A-M., Mäkitalo, Å. (2013) *Learning, Culture and Social Interaction*. 2(3) 171–183

The aim of Study 2 was to investigate challenges involved in using knowledge of a disciplinary field to reason about specific matters in one's own text. Challenges involved in making previous insights relevant and useful to one's own work have often been understood in terms of intertextuality and by means of studying intertextual features and forms of citing in documents. As an alternative, this study approached referencing as a discourse practice and a communicative process for students and teachers. This approach was realized by attending to the referencing as a question of re-using textual knowledge of a disciplinary domain, and of how such work is made intelligible to students.

Theoretically, as referencing was addressed as a problem in the supervision sessions, there had to be accounts of and support for alternative ways of working with other people's texts. As explanations for changes were offered but resisted, there had to be alternative elaborations of knowledge traditions

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and genre-related conventions. To find such sequences where previous insights and claims were operationalized for the students' text production, we scrutinized the entire material produced in the 14 cases. First of all, each occurrence where the participants interactively developed the concern, i.e. instances where citing and the use of sources were made into a specific topic and communicative project, was identified and logged. Here, we observed the process of taking a message (Bakhtin, 1986; Linell, 1998; Volosinov, 1986) from one situation to another through the following questions:

- How are messages in other people's texts recognized and oriented to as concerns for the emerging text?
- How are previous and new contexts for such messages shaped?
- In what ways are such messages repurposed?

In this study we initially found that writing with, from and in relation to other texts was a major participants' concern that surfaced across all 33 supervision sessions in the data corpus. It was not enough for these Master's students to make explicit references to other texts in their own papers, but the challenge consisted of reasoning about environmental engineering subjects in resonance with knowledge traditions and epistemic practices in this disciplinary field. An especially rich sequence where several of the recurring types of concerns were dealt with within one coherent event was singled out for the detailed analysis and for reporting the study. The explicit goal for the participants was to incorporate previous insights about water supply as a theme relevant for sustainable considerations of urban environments.

First, under a conversational theme of 'doing your own work', the student was oriented to ways of establishing her own line of reasoning. It was not enough to report others' findings and claims and to follow the structure of other documents. This concern was addressed by means of bringing a series of specific textual indications of citing and paraphrasing from the student's text into the conversation. In order to be useful, other people's findings and claims required re-organizing and re-structuring for the purposes of the student's own reasoning. It was therefore addressed as important to recognize the primary contexts and perspectives involved in other people's findings and claims. Accordingly, the participants' concern had to do with finding a way to discovering the primary context of previous claims and making those

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conditions functional for the specific sustainability context of the emerging report document and academic writing assignment. Such a process of contextualizing and recontextualizing is particularly tricky for someone who is new to a disciplinary field as it involves going beyond what is immediately visible in other's texts and dealing with messages. While the problem of reasoning with other people's texts was addressed by means of concrete formulations in the student's texts, referencing implied contextualizing previous messages in their original settings.

The other side of this particular concern stood out as a process of repurposing messages for the emerging text. The means for this was a distinction between the source text and its rationale from the student's emerging text in terms of their respective conditions and goals. Previous texts have been produced on certain terms, for certain purposes and are based on certain rationales. Therefore, it was not enough for the student to reuse and fit previous insights into her paper, but all claims required being made relevant in a new way and for the logic and reasoning of the emerging text.

Finally, we observed how tensions between reporting previous insights and reasoning about issues of sustainable development brought a series of communicative actions to the surface. Using examples involved choosing examples with some relevance for the student's own emerging issue and repurposing them for the shaping of an issue. As a matter of communication, repurposing involved a process of engaging with different ways of reasoning, of shaping different contexts, of repurposing messages, and of attending to messages and their capacity for the conditions emerging in the student text.

Overall, it was found that referencing poses particularly critical, communicative challenges - especially to newcomers, who face the demanding struggle of working out what kind of attention to textual genres is required for using previous, written knowledge in productive ways for their own assignments. On the basis of this, the article argued that supervision provided an essential event in the sense that the student was oriented beyond the linguistic incorporation of examples, findings and claims and was introduced to a series of epistemic practices by which she could make previous insights about sustainable development her own. This process involved not only appropriating ways of *recognizing primary contexts* but also ways of using other people's texts as messages to come up with something to say, i.e. *recontextualizing* messages. It also involved a process of *repurposing* previous

insights that required dealing with those insights on their own terms. Regarded as a practice, referencing is an essential dimension of disciplinarity.

### Study 3

# Reaching conclusions in academic papers: the rhetorical work of designing claims in environmental engineering education

Eriksson, A-M. (submitted manuscript, under review)

The presentation of conclusions in an academic writing assignment (i.e. in the form of a report) marks a significant and critical text section in the sense that it raises claims and promotes actions to be taken. Regarded as practice though, the concrete work of reaching conclusions implies a dual orientation to conditions on which claims can be grounded and to discourses by which conclusions can be comprehensibly articulated with relevance for a specific field (Bazerman, 2012a; Prior, 2005). From a dialogical and communicative perspective, shaping conclusions therefore imply a reflexive practice of the field and its ways of producing and accounting for knowledge. The aim of Study 3 was to address the challenges such a demanding task involves both for students who need to take proper actions in order to be able to draw conclusions in their reports, and for teachers who needed to address the reflexive orientation in concrete terms to make it comprehensible and operational to the students.

All video data documented in the supervision sessions were scrutinized to take stock of instances where ways of grounding and justifying claims were topicalized and addressed interactively. As such instances occurred irrespective of individual writing subjects, students and teachers, all the logged instances were inspected to identify typical events and comprehensive examples. Finally, two specific episodes from two different cases were singled out for detailed transcription and analysed with respect to the following questions:

- What access points for grounding and specifying conclusions are made available in the interaction around formulations in the text draft?

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- How are specific forms of reasoning operationalized as part of an overarching communicative practice of reaching conclusions and making recommendations?
- What ways of configuring and operationalizing conclusions are mediated in relation to environmental engineering as discourse practice and genre?

It was a major finding that close attention to concrete formulations in the students' drafts played a significant role in making the work involved in reaching conclusions comprehensible. Specific words and formulations came to function as mediational means for series of epistemic practices tied to the field of environmental systems analysis. These included: What do conclusions look like in this field? What is the role of conclusions about matters of sustainable development? What concrete, practical work is involved in this epistemic practice?

Grounding and specifying conclusions consisted of an argumentative orientation where intratextual work was an essential ingredient. What had been reported in previous sections of the students' texts, had to be recruited into an argument. Moreover, reaching conclusions and making recommendations were distinguished as different communicative practices in terms of their purpose and expected reception. Whereas conclusions required grounding in previous parts of the student text, making recommendations implied directing insights to the field.

Secondly, as a communicative practice, reaching conclusions entailed locating normativity as an argumentative end product. It was a challenge for someone in the student's position to notice how, for example, the verb phrase *should be* in an instance like "Sustainability assessment should be conducted as early as possible..." brought on a normative way of reasoning that was ungrounded and therefore unacceptable.

Thirdly, ways of reaching conclusions had to be made recognizable as knowledge to the field. One example of this showed how cultural, historically developed, ways of producing issues of sustainable development were fronted by means of attending to a visual presentation of a trend in very concrete manners. It was by attending to aspects of the trend as substantial matters of a concrete reality that epistemic practices were made concrete enough to be worked with.

Finally, another important access point entailed separating what conclusions and recommendations look like in a text from the work of carrying out such communicative tasks. Doing the work of reaching conclusions is one thing, and this requires participation in argumentation by means of carrying out practices of the field, whereas presenting conclusions is a different story. This required taking knowledge traditions on board and making them one's own.

As it was required that students directed their knowledge to the professional field, the challenge consisted of orienting to and engaging with practices that constitute scientific work in environmental engineering. As those practices showed to be significantly conditioned on discourses that make up and represent disciplinary life, it was observed that the interaction around linguistic details in the students' drafts provided access points to concrete ways of producing knowledge in the field. Making connections between words and the world of environmental engineering provided instances where a process of grounding claims could be experienced.

### Interaction in supervision

Most excerpts used as analytical illustrations in the three articles where the studies are reported portray students as relatively silent, and teachers as elaborators of the texts. Therefore, I would like to report some general observations from analysing supervision as a communicative practice before returning to the research question in the following Discussion chapter.

First, the students' texts marked significant contributions to the supervision in their capacities of constituting responses to the given assignment. Following from what can be considered a privileged situation of having an individual meeting about one's work with a scholar it was an obligation of the teachers' role to respond to the submitted text. This circumstance creates expectations about guidance for both parties involved that rely on the institutional function of supervision as a communicative practice (see Chapter 3).

Secondly, and as has explained in Chapter 4, being verbally silent is not the same as being inactive. Going back to the example in Study 3, where the teacher reformulates the wording of a particular sentence, it could be argued that the student is too passive to be learning and that the teacher is doing the

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student's work. However, my methodological approach reveals that this type of sequence, which is frequent in the empirical material, is characterized by a high degree of coordination indicated by, for example, minimal responses, overlaps and postures. As can be seen from most transcripts throughout the studies, details in the participants' interaction demonstrate that students are active interlocutors even when they are verbally silent. In fact, important contributions to the conversation often emerged by means of bodily orientations, through pointing, gesturing, nodding, eye contact or as minimal verbal responses. What was more, minimal responses like *mm:* or *ye::s*, or even absence of responses from the students, invited the teachers to continue elaborating and clarifying. As shown in several of the transcripts, such details in the interaction are very significant contributions in the supervision. These observations will be returned to in the following Discussion chapter.



# Chapter 6

## Discussion

The empirical material I have analysed lends itself to observing how ways of reasoning and arguing about issues of sustainable development are introduced and dealt with in the context of an academic writing assignment, and as part of supervision. Given a sociocultural and dialogical perspective on the study of text production as a mediating activity, it has been a premise that engaging with disciplinarity through textual genres and discourse constitutes a creative, communicative process. To recapitulate, the overarching research questions are directed towards how the students' text drafts were attended to as part of the supervision and what ways of approaching issues of sustainable development that these students were being introduced to. The empirical findings show that epistemic practices were made tangible and workable as students and teachers dealt with communicative challenges in the supervision sessions. My main argument, accordingly, is that producing a report as part of studying at university involves mobilizing, struggling with and appropriating epistemic practices. In this concluding discussion, I will further substantiate this argument by departing from the overarching questions, exemplifying what I have found in my empirical studies, and clarifying the implications of my findings. Accordingly, I will first discuss the role of students' texts in the supervision under the heading of attending to details in the students' texts. Secondly, I will discuss how issues of sustainable development were framed, employed and responded to. Finally, in a third section I will reflect further on the findings by discussing what an academic approach to knowledge traditions implied in the studied setting.

## Attending to details in the students' texts

As was pointed out in Chapter 3, engaging with disciplinarity involves grappling with knowledge traditions and their situated use. While the drafts of the report documents that the students and teachers are working with constitute a resource for situating issues of sustainable development, it is an empirical question how these documents are attended to and drawn upon to provide access points for students to begin engaging with knowledge traditions. The first research question concerns how such access points were provided as part of supervision.

It was a general finding across all the empirical studies that, given specific textual formulations in the students' individual drafts, the teachers could begin explicating, exemplifying and explaining epistemic practices for dealing with issues of sustainable development. In the following I will therefore discuss more precisely *how* disciplinary knowledge traditions were introduced and attended to by means of details in the students' texts.

### **Situation-transcending elements of supervision**

The studies in this thesis show that concrete formulations in the students' report documents function as mediating means for initiating and anticipating activities and actions yet to be taken. Such formulated activities and actions are situation-transcending in the sense that they go beyond producing a text, and also beyond what was presented in the text and the supervision situation *per se*.

For instance, when analysing the first supervision sessions specifically targeted in Study 1, it was found that students' outline documents were treated as something more than a first version of a text. Headlines like *aim* and *method* in an outline document were pointed out and reformulated in terms of actions, i.e. as something the student should do. Additionally, the order of suggested headlines in another outline document was addressed and temporarily reorganized to anticipate and organize a process by which the work was to be carried out in order to accomplish a study (see Study 1, Fig. 7). It was concluded that addressing specific formulations in the outline documents was a way of linking those formulations to actions to be carried out. By paying close attention to specific formulations, the students were made aware of certain actions and activities and oriented towards pursuing them. This explicit situation-transcending feature of the interaction implies that students at a later

stage in the process can be made accountable for *having* pursued such actions and activities.

To emphasize my main point here, concrete details in the students' texts played an important role as they coordinated the participants' attention and actions, and thereby functioned as organizing devices in the supervision conversation (cf. results by Svinhufvud & Vehviläinen, 2013; Vehviläinen, 2009a, 2009b). However, the students' texts were not only points of departure for supervision *per se*, but their details were repeatedly returned to as a significant semiotic means for moving students to act in this type of communicative practice. As I will discuss in the following, noticing particular instances in the texts was both a way to challenge the students' insights and a way to introduce how their work with the assignment could proceed and be further developed.

### **Anticipating a next step forward**

Across the empirical studies it was a major finding that details in the students' texts played a significant role in anticipating the progression of the text and thereby introducing 'a next step' in the students' work with their assignment. To exemplify, in early versions of the text drafts, where issues of sustainable development, for instance, were presented in bulleted lists or in terms of the questions provided in the assignment instructions (see Study 1), the drafts were used for making rather broad distinctions recognisable to students. As has been referred to above, the assignment could be separated into different activities like the carrying out of a study and the production of a report (Study 1), or in terms of producing trends by making comparisons and analysing trends to be able to reach conclusions. At later stages, when issues were more concretely described in developed text sections, teachers typically distinguished between, and thereby separated, different ways of reasoning. An example from Study 3 is a distinction that is made between normative statements about remedies for handling air pollution and disciplinary ways of reasoning and arguing that would make it possible to frame this subject as an issue in this field. To recapitulate, a series of specific verb phrases in one student's text, i.e. *should be* and *would be*, became a resource for elaborating normativity and separating this type of discourse from the expected one.

An additional example is that the teachers used textual details to address students' habits of reporting and recapitulating what they had read or heard in

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lectures by pointing out the expected argumentative features of the text. For instance, when a teacher says "it's not that you/.../don't understand that there are issues but you are not showing me it" (Study 2, Excerpt 3, line 66-68), he explicates this particular function of the text in the supervision practice. A similar example comes up as another teacher and student are dealing with a trend in Study 3: "most of the world is still here where it's going up/.../ so you have to say that" (line 118-123). As a conclusion, the progression of the student's text was thereby actualized in terms of actions that would help qualifying formulations in the texts. In my opinion, elaborations of this type help exemplify how the texts are both clear points of orientation and points of departure for trying to move students to action, step by step, and by anticipating what needs to be done.

The finding that broad distinctions were made during early stages of the texts and more demanding ones were made as the texts had developed, implies that the teachers successively shaped the expectations of how issues of sustainable development should be addressed by the students. While broad distinctions were made at early stages, students were presented with more critical questions once they had progressed with the assignment. As their texts were more developed, they were for instance presented with critical questions about the grounding of remedial actions (as in Study 2) or conclusions (as in Study 3). In my opinion, this points at the complexity involved in issues of sustainable development and also to the dynamism and open character of this type of knowledge field. There is no easy way of unwrapping what such issues involve but the students' texts provided necessary baselines from which the teachers could begin addressing increasingly more advanced aspects of what constitutes such issues. The finding that the teachers explicated their reading of the individual students' outline documents from their expert point of view implies that disciplinarity played an important role in these supervision encounters. It was, though, in relation to the text that they could make such practices concrete and workable.

From a pedagogical perspective, it is also significant to notice that guidance is an interactional achievement. Given the interactional order of supervision (see Chapter 3), students' and teachers' contributions are characterized by differences in perspectives that need to be coordinated to reach the object of the joint activity. What a textual formulation implies, and what type of function it can be used for, emerges as part of the participants'

joint orientations and sense-making process. This raises further questions about how epistemic practices can be conveyed to students.

### **Exemplifying and explaining epistemic practices**

One ambition of this thesis project has been to understand more precisely *how* doors to disciplinary can be opened for students. Analysing how specific textual formulations became mediational means for attending to epistemic practices has provided some insight here; I found especially that alternative procedures and approaches to those that appear in the student's text drafts frequently surfaced in the interaction, when the participants oriented towards improving the texts.

First, the empirical studies show that tensions emerged between the way these students were encouraged to do something that was genuinely their own and the constraints to which acknowledged ways of dealing with sustainable development gave rise. For example, and as mentioned in relation to situation-transcending elements, answers to questions in the assignment instructions had to be produced rather than found somewhere in ready-made form and reported in text. This finding was for example one of the main results of Study 2. To explain the significance of this result further, I would first like to recapitulate the results from Wertsch and Kazak (2011). Their study shows that teachers treated students' attempts to organize a set of statistical data on a graph paper as a cultural practice mediated by the layout of the sheet of paper. While the layout of this sheet of paper imposed several different options on the students for organizing the data, none of their solutions worked to solve the task. Wertsch's and Kazak's point is that the graph paper provided a starting point from which negotiation of meaning and *in situ* sense-making took place. Provided with the students' attempts at using the graph paper, the teacher could intervene and exemplify the culturally developed function of the tool in terms of limitations and restrictions for what could be done by using the graph paper. This provided possibilities for the students to explore the cultural basis of the tool, i.e. how it could and could not be used, and how one can turn a set of measurements into categories on the basis of this particular tool.

Similar conclusions can be drawn from the studies in this thesis. The way one student used the assignment instructions *per se* to put together an outline (see Study 1), was the starting point for how the teacher initiated and

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anticipated a sequence of alternative actions that could shape an issue of sustainable development in written form. This implies that specific uses of those instructions had to be explored and negotiated. Questions raised in the assignment description were accordingly not just to be answered, but they implied certain ways of engaging with issues of sustainable development. Thus, the questions pointed out a cultural embeddedness of the issues which the teachers could begin to introduce on the basis of the appearances of the students' texts. As part of this, the teachers oriented towards how the instructions functioned as pointers to epistemic work, i.e. concrete actions, the student needed to carry out.

Another example was introduced under a similar theme of 'doing your own work' in Study 2. Here, the teacher distinguished different speakers and their voices as separate from the student's agenda, by means of pointing to concrete reference markers i.e. ([10], [11]) in the student's text draft (see especially Excerpts 2a and 2b): "there's someone who has written about water (..) water infrastructure in in eh united states/.../they are saying that eh well we have some (.) remedies/.../here". By doing so the teacher used specific formulations, and especially reference markers, as mediating tools for introducing alternatives to the way other literature had been reported in the student's text. In this sense, referencing was raised and topicalized as a concern in the supervision sessions to explain that it involved much more than indicating positions in a text where other literature had been used. It was elaborated as a practice of recontextualizing and repurposing what other people had found and claimed, while recognizing the primary context for the original text.

One implication of these findings is that teachers are very important interlocutors as they can animate differences in perspectives and make *others*, in the Bakhtinian sense (Bakhtin, 1986), present. For instance, I would like to refer to the example from Study 2 once more (see Fig. 5 in the study):

- Teacher: I mean you are using an example here from (.) there's someone who has written about water (..) water infrastructure in in eh: united states  
Student: yeah  
Teacher: and eh there the infrastructure looks like (..) it's constructed in a certain way it's a certain design  
Student: aha

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Teacher: and then they are saying that eh well we have some (.) remedies

Student: mhm

Teacher: here ((pointing to the text))

Student: yeah

As was shown in Study 2, actualizing formulations in the student's text was more than an explicit orientation towards the text draft. The teacher's elaboration of the text section with specific regard to the reference markers not only illustrates that others are already speaking about issues of sustainable development, but also makes salient that there are concrete values and attitudes embedded in others' speech. It is therefore interesting that Lillejord and Dysthe (2008) found that students who were attending mixed group supervision where the participants came from a range of different disciplines and thereby different traditions benefitted from having *others* and their perspectives present and taking part in the discussion of their own papers. While the findings in the empirical studies of my thesis show how teachers animate others and bring others' perspectives into the conversation, it seems that it is through the elaboration of others that perspectives become concrete enough to be oriented towards by the students. This is an important finding as it implies that a similar orientation would be more difficult for students working on their own to take.

I have also found that close encounters with the formulations in the students' texts were used for making distinctions between epistemic practices and specific literate activities. For example, specific scientific terminology was regularly put into play and implications of using terminology were explicated and explained in terms of what to do. For instance, when a student initiated *analysis* as a topic in Study 1 by pointing to a model the teacher had sketched and said: "this is like for the analysis then?", the teacher first hesitated and then pointed to a question mark in the model and said: "yeah (...) I mean it it takes some kind of (..) analysis to find out (.) how this is linked". This is an example of how *analysis* begins to emerge as something that needs to be done but also as something much larger than a section in the student's text. Likewise, similar engagement with the term *structure* is observable across the excerpts in Study 2. Here, *structure* revealed a way of organizing references that reflected the student's way of working and producing the text. The teacher demonstrated that the students needed other, more initiated and qualifying, ways of working in order to achieve the expected quality of the text.

In their capacities of being open and dynamic, terms like analysis and structure are examples of terminology that came to function as vehicles for sensitizing students to specific disciplinary functions of those terms. But, put into play as in this empirical material, attending to terminology may become a resource for exposing students to epistemologies and ontologies essential to disciplinary life. Therefore, and in my opinion, aligning concrete textual contributions with epistemic practices was an important element in a process of guiding each student's work further.

### Framing, employing and responding to issues

The second research question guiding the studies in this thesis concerns challenges involved as students begin engaging in disciplinary practices that are new to them. Being at an early stage of a process of enculturation implies that students can use a certain term or perform certain actions that are characteristic of a practice. Accomplishing such actions on one's own and employing them competently, however, involves being sensitized to their semiotic functions in particular.

...the subject must be treated from a **sustainable development** point of view, taking **ecological, social, political and economic aspects** into account. The treatment of such subjects should include some aspects of **environmental measurements and/or other observations indicating the temporal trend of an environmental problem or aspect of sustainable development**, which is linked to your subject.

(Excerpt from the assignment description, see Appendix 1)

As was explained in Chapter 3, issues of sustainable development exemplify an encounter between different and sometimes diverging knowledge traditions. In the empirical material, such issues follow a special logic by which sustainable development is made measureable and assessable. While *sustainability assessment* is made explicit in the description of the students' individual assignments (Appendix 1), this special logic is also visible through the priority given to comparisons, trends and models across the entire material. To explain, it was found that the students were presented with



specific procedures, concepts and terminology for dealing with issues of sustainable development in the context of sustainability assessment. However, though, the students' assignments also entail showing that they can reason and argue through this type of logic by producing report documents. In this section, I therefore wish to discuss how students are challenged by devices like trends, comparisons and models that are brought into the supervision through the teachers' attempts to help students give a specific character to their sustainable development problems.

### **Dealing with sustainable development as an issue**

From the empirical studies, it has been found that tensions played out between *using* concepts, procedures, statistics, terminology etc. and *operationalizing* them as part of shaping issues of sustainable development.

One conclusion from Study 1 was that whereas trends and the operationalization of trends was one and the same thing for the teachers, the specific functions of trends had to be introduced and elaborated so that this became clear to the students. For example, the concept of a trend was initially introduced as a starting point for performing an investigation of air pollution as a problem for sustainable development. At early points in the students' work with the assignment, the teachers introduced trends as a general approach to issues in this field. Working from trends provided ways to compare different environmental measurements or other observations, i.e. differences between developed and developing countries over time would make it possible to make predictions about air quality. In later instances of supervision, the teachers introduced ways of making trends argumentative. For instance, the line graph used for elaborating how trends are means for reaching conclusions in Study 3 was also used for unwrapping trends as a practice and gradually transformed the concept of trends into an epistemological device. Here, the results also showed the extent of the cooperation and interactional work that had to be done in order to address the concept of trend as a form of reasoning in the field. As part of this effort, the teacher brought in ways of qualifying claims and the idea that it is impossible to present conclusions without proper backing. Accordingly, trends came to function as mediational means for reasoning and arguing about issues of sustainable development, as well as for reaching conclusions about such matters with relevance for the field. Attending to trends as

semiotic phenomena and epistemic practices brought in concrete ways of operationalizing them.

While these findings point out the importance of dealing with and struggling with epistemic practices, such as the formation and function of trends in concrete circumstances, it raises more general questions about what challenges representational devices pose to students. Trends as a general phenomenon are probably not new to engineering students at Master's level. On the contrary, it is their precise function and use in the given context that is challenging. In my opinion, grappling with trends as semiotic phenomena emphasizes, on the one hand, that trends are easy to use at the term level. In this sense they can be regarded as simple devices. On the other hand, and when put to use in argumentation, this type of device exemplifies how situated disciplinary practices unfold in concrete instances.

In a similar fashion, it was also found that models and modelling served as a rationale for building up issues of sustainable development while simultaneously presenting students with an approach for shaping an issue. This dual function was challenging, because students initially oriented towards issues as already shaped and constituted by others. When one of the teachers says: "eh (...) because it's not it's not about eh finding facts (.) and then eh (.) repeating it/.../it's about finding facts and putting it together" (Study 1, Table 4, lines 26-29), it is an example of a response to the student's situation that points out approaches of discovering rather than reproducing. To clarify, what emerges is the idea that issues were not to be found some place out there in some ready-made form, but they were to be produced. In my opinion, this type of challenge is typical not only of the teachers and students in the empirical material I have analysed, but for higher education in general. I am referring to the type of situation where students typically orient towards what they should write in their texts and to finding the most efficient way to write up a solution for their assignment. Comparisons, trends and models not only stood out as specific ways of coming to know about sustainable development, but dealing with issues of sustainable development by such devices implied iterative processes characterized by discovery. Typical for such processes is that one starts dealing with a problem somewhere, in some way, and gradually tests one's way forward. The difficult thing for teachers just as well as for students is then to find a productive starting point where this type of process can begin. Sustainable development plays out as particular ways of reasoning by means of devices like comparisons, trends and models. This equals

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participation in typified, disciplinary forms of organizing and producing knowledge. For these students, learning about issues of sustainable development implies showing not the issues as such, but their own sensitivity to and understanding of these types of fuzzy problems. Or, in other words, knowing has a performative element (Säljö, 2010); as previous insights are to be transformed and made productive in "locally relevant ways" (p. 60) and for locally relevant purposes.

In summary, while doing certain things in certain ways, and saying certain things in certain ways can be understood as steps in a process of enculturation, it is a different matter to make insights one's own and be able to operationalize them for one's own purposes. Struggling with organizing a study, with planning a document, with designing a comparison, and with qualifying claims provided important instances where challenges occurred. They had to be dealt with as performative actions involving text production. It was in the actual situation of having to solve problems and working out details that issues of sustainable development were made concrete and comprehensible enough for students to proceed. My point is that such challenges are reflective of knowledge in modern society. In my opinion, the struggle between habits of reporting existing knowledge and alternative ways of approaching knowledge visible across the empirical material is a reflection of a general challenge in modern knowledge societies. Research that emphasizes what students should know about genre seems to converge on results where the problems for students and teachers lie in their knowledge about genre, about audience and the rhetorical situation in which they are operating. I argue that this thesis adds to such perspectives by pointing out challenges involved in encounters with advanced discourse processes.

### Engaging with new forms of knowledge

On the basis of what has been found, I would like to reflect on what it means to be guided into the type of societal *hot spot* that issues of sustainable development represent. Such issues exemplify socially and politically charged problems where these students are required to act in academically relevant ways. Sustainable development is an area replete with value judgements and where it is common, even expected, to have an opinion. Concerns for our common future and our environment are discussed in nearly every public domain and taken up in most dimensions of people's everyday life. Waste,

energy consumption and the means by which we travel are but a few domains of Western society where sustainable development is an issue. Putting forward an opinion therefore seems to be an essential part of addressing issues of sustainable development. In academia, however, having an opinion is not enough. On the contrary, opinions must be argued for and grounded through relevant reasoning, step by step. Reasoning and arguing are usually considered crucial matters involved in what has been termed academic enculturation (Prior & Bilbro, 2012). In the empirical material, this is reflected through a reorientation from reporting knowledge towards ways of reasoning and arguing that would shape an issue. It is also reflected in how the students need not only show that they can use relevant insights from different fields but also that they can approach and position themselves in relation to issues of sustainable development. For example, the results from Study 2 show that this type of challenge involved sensitivity to others' speech, i.e. to different actors' agendas and interests in sustainable development.

Another reflection refers to instances across the material where it is clear that the students are not only required to engage with knowledge in relevant ways but should also show that they can position themselves in relation to knowledge. In such instances these students' engagement with issues of sustainable development observably, and interestingly, seem to rely on an element of detaching themselves from the forms of life such issues involve. One example was the step-by-step unwrapping of what it involves to justify an observation expressed as "the[y] forecast rising global emissions", that was analysed in Study 3. A significant turning point in this episode occurred as the question *why?* was introduced and elaborated by means of a line graph. As could be seen from Study 3, drawing a line graph while linking steps in a process of justification introduced the student to the situated production of a trend and thereby a procedure for qualifying her claim. At the same time, the teacher in this instance explicates what types of actions reasoning and arguing involve. The interesting matter is that by describing how justification gets done in this detailed way, the teacher is himself providing an example of how a reasoned argument gets done. This semiotic function is emphasized and made explicit by introducing the question of *why?* and in comments like "you've to say that" (i.e. say that in your text) directly after an elaboration.

Communicative situations like these in the data illustrate what the students' job entails. It is not enough to report what others already know but the assignment entails showing that one can reason about a certain subject in the

form of an issue for sustainable development and come up with some kind of conclusion. Communicatively, responding to issues of sustainable development involved addressing the field on its own terms, i.e. by taking conditions for how disciplinary knowledge is being produced and presented for consideration. This type of analytical and critical, or even scholarly, position involved what can be termed speaking from a distance and signified a demanding step in a process of enculturation. To summarize, it might be especially difficult to assume this type of critical and analytical position in hot spot areas where one is expected to take a stand.

### Summary and conclusions

While academic writing assignments constitute a common pedagogical means for scaffolding students' encounters and engagement with knowledge, previous research has repeatedly shown that producing text of this type is an arduous, demanding task. For example, the results of studies by Dysthe (2002, 2012) demonstrate that it is difficult for members of a community of practice to unwrap conventionalized and routinized practices that are embedded in disciplinarity and are constitutive of their daily work. As has been shown, I have made the same general observation in this empirical material and would like to argue that issues of sustainable development exemplify advanced practices that do not lend themselves to easy explanations and straightforward instructions. The teachers in the empirical material I have used seldom gave up, but returned to the same phenomena again and again, while trying different ways of elaborating what they saw as problems in the texts. One conclusion from this observation is that textually mediated interaction was an important factor for these members' access to otherwise routinized practices for dealing with issues of sustainable development.

Furthermore, it seems that supervision offers a privileged form of instruction. As explained previously, links between the way supervision is carried out, the type of texts that are requested and knowledge traditions of the particular field where supervision is carried out have been demonstrated in other research. While the three empirical studies confirm such results, I will go one step further by pointing out the scaffolding of fuzzy problems characteristic of new forms of knowledge in this way. My point is that supervision provides a site where the students' reasoning and arguing can be moved forward. Talking about and discussing specific matters with regard to

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specific issues, testing alternative solutions to specific problems and alternative ways of formulating the texts, discussing different possibilities for policy making, technology solutions, political standpoints, testing the consequences from shifting values, and experimenting with different options for sustainable development, were in themselves reflections of what those issues are about. This means that there is an intriguing reflexivity in these activities. In my opinion, all the studies in this thesis show that producing text and discussing their details seem to have the potential of guiding students into dialogue with a field where they can develop ways of taking different perspectives and stakeholders' premises into consideration. An orientation of this kind must be very difficult to take on one's own, and especially for someone in the role of a student. It seems to require time and recurrent encounters where gradually more concrete aspects of epistemic practices can be experienced.

The amount of intense interaction and coordinated work around details in the students' texts that the empirical studies make visible seem to imply three things. First, advanced epistemic practices are difficult to explain. Second, epistemic practices are difficult to pass on. Third, generalized explanations are insufficient support for operating in alignment with such practices. Therefore, I propose that formulating knowledge in the setting I have studied is a matter of participating in epistemic practices, i.e. students are compelled to act in disciplinary ways and put what they do into words. In my opinion, the assignment these students are given is representative of several demanding elements that characterize knowledge in modern societies. One such element is qualified reasoning and argumentation. While many areas of modern life require having an opinion, such statements in the students' texts are challenged by alternative discourses and ways of reasoning. Qualified reasoning requires grounding one's argumentation by orienting to and aligning with socially and culturally developed knowledge traditions characteristic of the field. Such reasoning would be a mark of enculturation, and in an educational setting also an indication of someone who is knowledgeable. Another such element regards the way the participants in the material I have used dealt with issues of sustainable development as a matter of engaging with practices through discourses. In order for the students to say something substantial about their issues, it was necessary to engage with, for example, the concrete details embedded in the representational shape of a trend (see Study 3), or the primary conditions for other people's claims about remedial actions

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to water supply problems and sustainable infrastructure (see Study 2). Reasoning and arguing thus involved using not just the indicative forms of rising pollution levels but dealing with trends as concrete cultural activities and reason from its concrete details, such as statistics embedded in this type of cultural, representational form. From what the empirical studies have shown, it seems that the type of qualified reasoning the students were guided into involved gradual appropriation of such semiotic activities. To close, using statistics, extracting relevant information, creating trends, performing comparisons, and using specialized terminology are examples of practices that can be appropriated. Such practices are, in my opinion, characteristic of many areas of modern society and therefore essential to processes of formulating knowledge.





# Chapter 7

## Summary in Swedish

Denna avhandling har vuxit fram ur ett intresse för vad det innebär att möta och ta sig in i kunskapstraditioner och specifika kunskapsfält inom ramen för högre utbildning. En vanlig undervisningsform för detta är arrangerandet av olika former av skrivuppgifter där studenter sätts att närma sig och undersöka ett specifikt stoff. Uttryckt i sociokulturella termer är det generella intresset för avhandlingen att undersöka hur deltagande i sådana textpraktiker fungerar för, å ena sidan, studenter som ska ta sig an kunskapsfält som är nya för dem och, å andra sidan, för lärare som ska introducera studenter till sina specifika fält och dess epistemiska praktiker. I fokus för avhandlingen står handledning av en skrivuppgift som ges på en utbildning i miljöteknik, och för studenter på masternivå. Genom denna uppgift ställs studenterna inför frågor rörande hållbar utveckling, vilka ska undersökas och presenteras i form av ett dokument vilket benämns rapport. Avhandlingen som sådan utgör en sammanläggning av två delar där den första introducerar forskningsproblemet, beskriver det analytiska arbetet och diskuterar resultaten av tre empiriska studier. Den andra delen utgörs av just dessa tre studier, vilka representerar det empiriska arbetet.

### Introduktion

Inom högre utbildning ramas skrivande ofta in som en form av kunskapsutövning. Även inom utbildningar som traditionellt sett inte är specifikt inriktade på framställandet av texter kan man notera att just skrivuppgifter får allt större utrymme. Skrivuppgifterna används som en resurs för att undervisa och blir på så vis en del av hur undervisningen organiseras.

Denna textproduktion har ofta förståtts i termer av särskilda, strategiska förmågor som studenter ska ta till sig. Konkreta arrangemang med denna utgångspunkt finner man till exempel under beteckningen skriva-för-att-lära och lära-sig-att-skriva (Poe et al., 2010; Tynjälä et al., 2001). Sådana insatser uppmärksammar skrivande inom discipliner (Hirvela, 2011) och accentuerar skrivandet som en form av kunskapsutövning vilken går att använda för kunskapsproduktion. Skrivande har med andra ord blivit en fråga om just kunskap. Detta synliggörs till exempel genom att universitet världen över investerar i riktade åtgärder som särskilda skrivcentrum och undervisning i just det akademiska skrivandet (Thaiss et al., 2012). Sådana åtgärder pekar på en ökad uppmärksamhet både ifråga om vad det praktiskt innebär att producera akademiska texter, och ifråga om textproducerande som en väsentlig faktor för att utveckla kunskaper. Detta väcker frågor om hur relationen mellan att producera akademiska texter och att utveckla kunskaper ser ut.

Frågor av det här slaget har till exempel undersökts genom en rad interventionsstudier (Bangert-Drowns et al., 2004; Wingate et al., 2011) där sambandet mellan vad människor lär och deras texter tas som en relativt oproblematiske utgångspunkt. Resultaten av sådana studier handlar som regel om hur skrivuppgifter bäst kan introduceras och hur studenternas arbete bör struktureras. Vidare har frågan också undersökts i studier som har följt hur studenters texter förändras över tid (Artemeva, 2008, 2009), och genom textanalys har man funnit samband mellan texters kvaliteter och de kontexter där individerna producerat dessa. Ett annat sätt att undersöka frågan har varit att följa individer genom deras texter för att se hur de utvecklar genrekunskaper (Dressen-Hammouda, 2008) eller hur deras identitet förändras. I detta sammanhang har man till exempel dokumenterat att individer förändrats i relation till de sammanhang där de har agerat. I kontrast till detta har textproduktion inom högre utbildning också undersökts som en process genom vilken människor närmar sig kunskapsfält. I sådana sammanhang har akademiska texter förståtts som textpraktiker vilka operationaliserats i relation till de kunskapstraditioner som finns inom ett fält (Bazerman, 1988; Berkenkotter & Huckin, 1995; Prior, 1998). Det som i andra sammanhang har beskrivits i termer av texters innehåll, form och struktur har i dessa traditioner att göra med socialt genererad kunskap och hur kunskap etablerats genom sociohistoriskt framvuxna praktiker. Skrivprocesser och praktiker förstås därmed som dimensioner av det arbete genom vilket kunskapsfält och deras sätt att resonera etableras och upprätthålls (Bazerman,

1997a). Vidare kan man också se relationen mellan texter och deras omgivning som kommunikativ: ”The typification embedded in genre is one of situations, possible response, motives, realizable through imaginable action, and projections of possible futures” (Bazerman, 1997a, p. 302). Ur ett sådant resonemang följer att frågan om vad det innebär att möta, utforska och formulera kunskap handlar om hur människor tar sig an praktiker.

## Forskningsproblem och syfte

Avhandlingen tar sin teoretiska utgångspunkt i en sociokulturell syn på lärande, språk och kunskapsutveckling (Säljö, 2005; Wertsch, 1991, 1998; Vygotsky, 1978, 1986) samt i dialogismen och dess teorier om kommunikation, interaktion och meningsskapande processer (Bakhtin, 1981; Linell, 2009; Rommetveit, 1992; Volosinov, 1986). Detta innebär att skrivande ses som lärande, som en process som är materiell (dvs. konkret), interaktionell (dvs. kommunikativ) och kreativ. Vidare implicerar perspektivet att textproduktion i akademiska sammanhang förstås som en situerad aktivitet (Prior, 2006; Wertsch, 1998, 2007) vilken innebär en form av enkulturation (dvs. appropriering) genom deltagande i textpraktiker och diskurser knutna till specifika fält. Textliga genrer ses som framvuxna ur de traditioner genom vilka ett fält producerar och presenterar sin kunskap och som bärare av de samma (Bazerman, 2012a; Miller, 1984). När de kommer till användning, dvs. omsätts i interaktion, kan de fungera som medierande redskap (Wertsch, 2007; Vygotsky, 1978). Sammantaget förstås vad som i allmänna ordalag benämns akademiskt skrivande som en pedagogiskt situerad praktik och medierande aktivitet. Metodologiskt implicerar detta perspektiv att jag närmar mig textproduktion som ett konkret arbete och analyserar detta arbete som en kommunikativ process betraktad ur deltagarnas perspektiv. Detta sätt att rama in problemet är i linje med tidigare empiriska studier av textuellt arbete som disciplinära, medierande processer (Bazerman, 2012b; Dysthe, 2002; Molle & Prior, 2008; Prior, 1998).

I fokus för analysen står den kommunikativa spänning som skapas i mötet mellan att som student *introduceras* till, och att som lärare *introducera studenter till*, frågor om hållbar utveckling. Avsikten med att analysera just detta är att bidra till en mera finkornig bild av vad människor behöver brottas med när de tar sig in i kunskapsfält genom skrivprocesser. Den empiriska omgivningen där detta studeras utgörs av en masterskurs inom fältet Environmental Systems

## FORMULATING KNOWLEDGE

Analysis med inriktning mot Environmental Measurements and Assessments. Här genomför 14 studenter den skrivuppgift som innebär att producera en rapport om en specifik fråga om hållbar utveckling. Varje skrivuppgift adresserar alltså en specifik hållbarhetsfråga, som till exempel energikonsumtion eller internationell handel och dess roll för en hållbar utveckling. Ett bärande element i stöttningen av studenternas textproduktion är en serie individuella handledningssamtal där olika utkast av respektive individs framväxande text diskuteras. Dessa samtal, dvs. handledningen, utgör den institutionella, kommunikativa praktik som jag har studerat. För att närma mig de utmaningar med avseende på kunskapsutveckling som framträder i dessa samtal utgår jag från följande frågor:

- Hur uppmärksammas och används studenternas texter inom ramen för handledningen?
- Vilka sätt att rama in, hantera och respondera på frågor om hållbar utveckling introduceras och iscensätts?

Den första frågan handlar om vilka utmaningar som studenter och lärare ställs inför genom det konkreta arbete som sker *in situ* när specifika textuella detaljer adresseras och används för att guida studenternas arbete med att ta sig in i frågor om hållbar utveckling. I handledningen handlar detta delvis om hur textliga konventioner för hur den textliga genren rapport ser ut i just denna miljö introduceras, men också om hur sådana konventioner har att göra med sätt att resonera och argumentera kring frågor om hållbar utveckling. För att en enkulturationsprocess ska kunna påbörjas behöver studenterna få hjälp att hitta startpunkter så att de kan initialt få tillgång och på så vis börja delta i fältets praktiker. Frågan handlar därmed om hur texterna används för att skapa sådana initiala ingångar.

Den andra frågan adresserar utmaningar ifråga om hur vetenskapliga sätt att producera kunskap introduceras och görs begripliga och hanterbara under handledningssamtalet. Som problem betraktat handlar detta å ena sidan om att studenter möter och behöver använda specifika tillvägagångssätt, begrepp, koncept, och former för att föra en argumentation som är nya för dem vilket kräver stöttning. Å andra sidan handlar problemet om att handlingar av den här typen kräver en viss känslighet för diskursiva och semiotiska dimensioner av desamma. Det är en sak att initialt kunna använda ett visst begrepp, och en

annan sak att ha insikt om, och kunna förhålla sig till, på vilket sätt detta begrepp är centralt inom en kunskapstradition och hur man använder det.

Genom att analysera handledning som en kommunikativ praktik och utifrån dess kommunikativa, dialogiska bas, bidrar denna avhandling till ny kunskap om vad textbaserad handledning innebär. Tidigare forskning inom andra fält har visat att textbaserad handledning struktureras av hur studenternas texter ser ut (Svinhufvud & Vehviläinen, 2013). Studier har också visat att konkreta detaljer i studenters texter utgör viktiga resurser för att konkretisera och förstå kommentarer som lärare ger (Jansson, 2006; Macbeth, 2006). Dessutom finns många tidigare resultat som visar att enkulturation är en krävande och utdragen process (Prior, 1998; Prior & Bilbro, 2012). Genom att undersöka några aspekter av vad som verkar vara en lång enkulturationsprocess med fokus på de utmaningar som textproduktion för med sig för studenter så väl som för lärare, är ambitionen att avhandlingen ska bidra med att synliggöra det konkreta arbete som krävs för att enkulturation ska kunna ta sin början.

### **Specifika teoretiska utgångspunkter**

Det analytiska arbetet tar sin utgångspunkt i begrepp som disciplinäritet (Prior, 1998, 2006), praktiker, kommunikation (Linell, 1998, 2010; Volosinov, 1986), och mediering (Säljö, 2009; Wertsch, 2007; Vygotzky, 1978, 1986). Disciplinäritet handlar om kunskapsfält, deras processer och kunskapstraditioner. Discipliner ses med andra ord som framvuxna ur historiska och kulturella sammanhang och som förenade av praktiker. Som disciplin betraktad kan ett område som miljöteknik därmed förstås som ett differentierat fält sammanhållet av delvis motstridiga perspektiv, och av flera olika aktörer och samexisterande diskurser. Det som förenar fältet handlar t.ex. om att vissa typer av frågor och samhällsproblem uppmärksammas och adresseras, men inom fältet finns det olika hänsyn att ta för att kunna utforma såväl vägledande policydokument som tekniklösningar. Disciplinäritet handlar också om textpraktiker, vilka hänger samman med hur man resonerar och argumenterar inom fältet. Textpraktiker har vidare också att göra med hur kunskap inom fältet artikuleras, dokumenteras och sprids.

Disciplinäritet innebär i denna avhandling en syn på kunskapsfält som organiserade genom sina kunskapstraditioner, vilka manifesteras genom epistemiska praktiker. Det finns därigenom en förbindelse mellan det som

sker i ett *här och nu*, hur fältet har utvecklats, och hur det kommer att utvecklas (Wertsch, 1991, kap 6). På så vis handlar disciplinärhet om en process och inte ett stabilt tillstånd. Att producera text i sammanhang som har med discipliner att göra innebär att delta i epistemiska praktiker eftersom den framväxande textens resonemang, argumentation och uppbyggnad behöver ansluta till diskurser och textpraktiker som omfattas av fältet och dess arbete (Prior, 1998).

För forskning inom sociokulturella traditioner intar språket en central roll. Språk ses som ett semiotiskt redskap, som det i metaforisk mening benämns av Vygotsky (1986). Det är i den situerade användningen av språk och i andra kommunikativa handlingar som vi människor kommer att brottas med överordnade kommunikativa aktiviteter, som att argumentera eller till exempel presentera hållbarhetsfrågor. Uppfattningen att det är genom denna lokala, d.v.s. situerade, användning av språk som människor deltar i interaktion och kan enkultureras sig genom att delta i praktiker utgör grundbulten i sociokulturella perspektiv på lärande. En central idé är också den medierande aktiviteten vilken utgör själva analysenheten (Säljö, 2009). Genom att delta i textproduktion deltar man i aktiviteter där till exempel textliga genrer tas upp som medierande redskap för att föra ett resonemang, vilket exempelvis skulle kunna etablera en hållbarhetsfråga eller grunda en slutsats i specifika resultat. Det kännetecknande för en handledningssituation är att den utgör en praktik där medierande redskap avsiktligt introduceras (Wertsch, 2007) för att stödja studentens arbete. Ett annat kännetecken är att handledning i sig utgör en institutionaliserad form av samtal (Linell, 1998), och därmed en kommunikativ praktik. Detta vill säga att det finns vissa etablerade förväntningar på vad handledning innebär, vad som ska uppnås och hur deltagarnas bidrag ska se ut, vilket tar sig uttryck i de kommunikativa projekt som etableras i denna aktivitet och även genom den interaktionsordning som kännetecknar och upprätthåller aktiviteten (Linell, 1998, 2010).

I ett sociokulturellt perspektiv blir frågan om hur man tar sig in i ett fält mycket central, och därmed aktualiseras också frågor om enkulturation, dvs. frågor om hur man tar sig in i, tar till sig och guidas genom ett fält. Att studera handledning av textproduktion inom ett disciplinärt fält är därigenom ett sätt att närma sig denna kärnfråga.

## Forskningsdesign och forskningsmetod

Avhandlingen kretsar kring tre empiriska studier baserade på 14 fall där studenter på masternivå arbetar med att producera en rapport om var sin specifik fråga för hållbar utveckling. Det empiriska materialet utgörs av videofilmade handledningssamtal kring uppgiften och de textunderlag som diskuteras i handledningen. Deltagargruppen består dels av de 14 masterstudenter som deltar i kursen, dels av de 3 lärare som undervisar i kursen. Inom deltagargruppen finns flera språkbakgrunder representerade. I enlighet med rådande förhållanden för internationella masterutbildningar i Europa genomförs kursen och allt studentarbete på engelska.

Arbetet med att producera rapporten innebar att studenterna fördjupade sig i ett givet ämne genom litteraturstudier. Studenternas uppgifter fördelades så att varje lärare följde fyra eller fem studenters arbete under fem veckor. Handledningen organiserades som ett enskilt möte mellan student och lärare. Varje student deltog i minst två men i fler fall tre handledningsmöten. Studenternas textunderlag lämnades som regel in i förväg, dvs. före handledningen, vilket gav lärarna möjlighet att förbereda kommentarer. Mot slutet av kursen förekom också några oplanerade handledningstillfällen där studenterna inte skickade in sina texter i förväg.

Det dokumenterade videomaterialet omfattar 33 handledningstillfällen distribuerade över de 14 fallen och fördelade över tre olika tillfällen för handledning. Hela materialet digitaliserades och transkriberades initialt för att skapa en överblick över materialet i sin helhet. I detta första stadium av analysarbetet följdes deltagarnas interaktion (Heath & Hindmarsh, 2002; Heath et al., 2010; Jordan & Henderson, 1995) genom att deras samtal dokumenterades. Denna databearbetning genererade cirka 20 timmars transkriberat videomaterial. Innehållsliga teman i interaktionen identifierades genom deltagarnas kommunikativa projekt (Linell, 1998) och de utmaningar som de orienterade sig mot. Allt eftersom vissa innehållsliga teman utkristalliserade sig tvärs över materialet följde en mer ingående transkription av utvalda aktiviteter inom dessa teman. I detta senare skede av analysarbetet analyserades interaktionen med fokus på deltagarnas meningsskapande, det vill säga deras lokala *sense-making processes* (Linell, 1998). Analysarbetet inkluderade i denna fas även multimodala och semiotiska drag i deltagarnas interaktion. Detta innebar att studenternas texter inkluderas i analysarbetet i den mån de användes av deltagarna. Likaså omfattade den detaljerade

transkriptionen deltagarnas pekningar, gester, röst, mimik och kroppshållning i transkriptionen.

Avhandlingen baseras på det empiriska materialet i sin helhet men ett specifikt urval av material gjordes för respektive studie. Studie 1 omfattar samtals- och textmaterial från det första handledningstillfället för alla 14 fallen. Här studeras bland annat hur handledningen strukturerades som en kommunikativ praktik, se nedan. Studie 2 och studie 3 omfattar analyser av materialet i sin helhet med fokus på innehållsliga teman som var återkommande i materialet. I studie 2 studeras refererande som en praktik och i Studie 3 studeras vilka utmaningar det innebär att dra slutsatser. Specifika exempel där tematiken var särskilt tydlig valdes sedan ut för att rapportera studierna i artikelformat.

## De empiriska studierna och deras resultat

Fokus i analysarbetet har varit de kommunikativa projekt (Linell, 1998, 2010) som utvecklas av deltagarna och de utmaningar i textproduktionsarbetet (eng: *concerns*) som de gemensamt orienterar sig mot i interaktionen. Med kommunikativt projekt menas i analytiska termer en sekvens där deltagarna engagerar sig i ett visst problem vilket då strukturerar deras handlingar och aktiviteten i sig.

Studie 1 handlar om det initiala skedet i socialiseringsprocesser när människor närmar sig ett kunskapsfält som är nytt för dem. I fokus står därför det första handledningstillfället för samtliga 14 empiriska fall. Detta handledningstillfälle ägde rum på ett tidigt stadium i studenternas skrivarbete och vid handledningen diskuterades mycket preliminära utkast till texter, vilka kallades *outlines*. I analysen undersöktes dels handledning som en kommunikativ, institutionell praktik, dvs. hur själva handledningen utspelade sig interaktivt och hur samtalets delaktiviteter såg ut tvärs över det utvalda materialet; dels undersöktes de ingångar till fältet som gavs ifråga om epistemiska praktiker när det gäller hur frågor om hållbar utveckling hanteras inom det fält där kursen gavs. Sådana epistemiska praktiker utgjordes av vissa nyckelteman som introducerades och elaborerades. Dessa handlade dels om tillvägagångssätt för att rama in och undersöka hållbarhetsfrågor, dels om att etablera argumentation samt aktiviteter för att komma fram till resultat.

Resultaten visar att handledningspraktiken som sådan innehöll flera typer av distinktioner vilka gjordes utifrån att det befintliga textunderlaget skulle



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kommenteras samtidigt som det kommande arbetet skulle initieras och prepareras. Studenternas dokument hanterades och diskuterades som en uppgift i sig och dessutom som ett arbete som utförs när man genomför en studie. Deltagarna samtalande i termer av det textdokument som skulle produceras och i termer av det arbete som behövde utföras för att kunna producera texten, dvs. vad skrivprojektet innebar. Benämningar som *trend*, *comparison* och *model* behandlades som konkreta, forskningsmässiga handlingar och metoder för att genomföra det arbete som krävs för att göra en studie. Studien visar också att dessa element introducerades som resurser för att föra en argumentation om hållbar utveckling. Sammanfattningsvis, pekar studien på att en viktig ingång för att närma sig fältet utgjordes av den *outline* som studenten producerat eftersom den blev en utgångspunkt för att adressera studenterna som deltagare i fältets praktiker. Tillsammans med en mer erfaren person kan studenter börja använda ord och begrepp som de ännu inte äger. På så sätt bereds en väg för att kunna uppleva och erfara något nytt, och på så sätt går det att gradvis ta sig in i kunskapstraditioner.

I Studie 2 studerades de utmaningar det innebär att ta sig an den samlade kunskapen inom ett fält. Målet var att komma närmare vad som i textbaserade forskningsperspektiv ofta benämns intertextualitet och som inom ramen för denna avhandlings intresse handlar om refererande som praktik, det vill säga hur man använder andras texter i sin egen text. En översikt över hela materialet visade att detta var en av de stora och återkommande utmaningarna i alla 14 fallen, och något som dessutom återkom oberoende av vid vilken tidpunkt i skrivarbetet som handledningen ägde rum, oberoende av specifikt ämne för rapporten liksom oberoende av vilken lärare som agerade i rollen som handledare. För att komma nära vad utmaningen bestod i valdes därefter en specifik sekvens i materialet ut för detaljerad transkription. Just denna sekvens valdes utifrån att referenser som angetts i en av studenternas texter användes för att adressera flera av de olika typer av utmaningar som var återkommande i materialet som helhet.

Studien visar att refererande handlade om att erfara skillnaden mellan att rapportera vad andra har kommit fram till och att skapa ett eget resonemang och argumentation. Ett medel för detta var att kontextualisera tidigare slutsatser och argument vilket krävde att man fick syn på just det sammanhang som en viss annan text befann sig i. Detta innebar en förståelse för vad Rommetveit har kallat *message* (Rommetveit, 1974), dvs. den dialogiska och kommunikativa innebörden och vidden av ett yttrande. Vidare visade

resultaten att arbetet med att re-kontextualisera någon annans slutsats hade samband med att man skapade ett sammanhang för den egna texten. Det var inte tillräckligt att återge andras slutsatser. Att skriva en rapport om en fråga för hållbar utveckling innebar att föra ett resonemang och argumentera. Ett resultat från analysen av den specifika episod som valts ut visade att studenten lotsades in i handlingar för att omsätta tidigare genererade insikter, men också in i handlingar för att omsätta dessa för studentens egna syften och argumentation. Resultaten visade att detta innebar att omsätta vad andra skrivit, dvs. tidigare *messages*, för nya syften. Studien drar slutsatsen att som praktik innebär refererande en rad aktiviteter som innebär en orientering mot att transformera och reformulera tidigare insikter. Refererande handlar om att orientera sig mot andras texter på deras egna villkor, dvs. som situerade yttranden. Man behöver inse på vilka sätt de kan ha relevans i ett nytt sammanhang, och använda detta som bas för att formulera sina egna syften, dvs. re-formulera dessa i ett nytt sammanhang. Att närma sig detta är en stor utmaning för den som är ny inom ett särskilt fält.

Studie 3 behandlar de utmaningar studenter och lärare engagerar sig i när det gäller att konkludera studenternas frågor om hållbar utveckling. Att dra slutsatser innebär i det perspektiv avhandlingen tar att studenterna deltar i en disciplinär, kommunikativa praktik där man riktar sin kunskap till ett fält. Detta studerades som en fråga om vilka diskursiva utmaningar det innebär att komma fram till slutsatser. I likhet med förfarandet för Studie 2, gjordes först en översikt över hur denna utmaning såg ut i hela materialet, dvs. över 33 handledningstillfällen. Därefter valdes några representativa och tydliga exempel ut för mer detaljerad analys. Slutligen användes två episoder (från olika fall) som exempel för att i detalj följa hur deltagarna tog itu med utmaningar ifråga om att dra slutsatser på basis av hur studenternas texter såg ut.

Resultaten från denna studie visar att en avgörande faktor i arbetet med att göra denna kommunikativa praktik begriplig var att gå mycket nära studenternas texter. Genom att adressera specifika formuleringar preciserades hur slutsatser kan se ut i en text, hur slutsatser fungerar, vad som krävs för att kunna presentera slutsatser och hur slutsatser med relevans för frågor om hållbar utveckling produceras inom just det aktuella fältet. I analytiska termer visade resultaten att specifika ord och formuleringar i studenternas texter kom till användning som medierande redskap för att separera specifika aktiviteter, så som att beskriva, att göra normativa utsagor, och att dra slutsatser. Textliga

formuleringar gav en öppning för att arbeta med slutsatser i termer av aktiviteter och som en praktik vilken gör anspråk på att leverera slutsatser grundade på substantiellt genererade resultat. Detta handlade om att göra distinktioner mellan aktiviteter som att beskriva eller vara normerande, och mellan att dra en slutsats eller presentera en rekommendation

Vidare användes specifika formuleringar för att explicitgöra ett slags inomtextligt arbete, dvs. hur det som presenterats i tidigare delar av en text kan användas för att grunda, precisera och kvalificera en slutsats. En konkret utmaning i detta handlade om hur och varför en trend kan påvisa en trolig framtida utveckling ifråga om ett miljöproblem. Utmaningen bestod delvis av att resonera i termer av trender för att föra en argumentation. Genom att flytta uppmärksamheten fram och tillbaka mellan bilden av en trend, vilken i det här fallet utgjordes av en graf, och konkreta re-formuleringar i en av studenternas texter konkretiserades och synliggjordes innebörden av denna trend men också arbetet med att skapa en trend. Att transformera trenden från dess konkreta, grafiska framställningsform till konkreta, textliga formuleringar var alltså ett sätt att explicitgöra hur kunskap produceras och formuleras inom fältet.

Studien drar slutsatsen att ett nära möte med textliga formuleringar i det här fallet gav tillgång till en semiotisk och epistemologisk dimension av textarbetet. Att dra en slutsats innebar att ha lotsats in i en känslighet för hur trender produceras och hur de kan användas för att resonera och argumentera om hållbar utveckling.

### Sammanfattning och diskussion

De sammantagna resultaten av de empiriska studierna synliggör viktiga dimensioner av hur skrivprocesser på samma gång utgör kunskapsprocesser. Att dessa processer är svåra att skilja åt är i sig inget nytt, och den uppmärksamhet som akademiskt skrivandet får vittnar redan mycket väl om detta. Däremot är det en strävan i detta avhandlingsprojekt att försöka synliggöra något av det konkreta arbete det innebär att formulera kunskap. Mitt huvudsakliga argument är att producerandet av en rapport under de förutsättningar som jag har studerat innebär att delta i och brottas med epistemiska praktiker. Förutom att ägna sig åt detta huvudfokus, synliggör avhandlingen också frågor som har med handledningspraktiken att göra. Avslutningsvis sammanfattas därför huvudresultaten i förhållande till

forskningsfrågorna och därefter diskuteras de frågor som dessa resultat pekar på.

För det första visade de tre empiriska studierna att studenternas texter fyllde flera centrala funktioner i handledningen. Som institutionell, kommunikativ praktik betraktad utgör handledning ett samtal där man lotsar och säkerställer studenters arbete, och där deras kunskaper utvärderas. Tidigare forskning inom till exempel konversationsanalys har visat att just texter är centrala för själva praktiken och det deltagarna engagerar sig i. Så var även fallet i denna avhandlingsstudie. Dels fungerade texterna som resurser för att situera frågor om hållbar utveckling så att de blev arbetsbara för studenterna. Dels fungerade de som resurser för att skapa konkreta startpunkter för att initialt delta i epistemiska praktiker genom att texter användes för att initiera aktiviteter. Resultaten visade också att det var detaljer i texterna som kom att fungera som medierande redskap för att uppmärksamma och arbeta med epistemiska praktiker i form av textliga genrer och diskurser.

Till att börja med visar studierna att detaljer i studenternas texter användes som medierande redskap för att initiera och explicitgöra konkreta handlingar och aktiviteter bortom producerandet av själva texten. Genom vad som kan kallas textnära kommentarer, dvs. kommentarer till detaljer i texterna, orienterades studenterna mot särskilda handlingar och aktiviteter, dvs. mot aktiviteter som ska göras. Studie 1 visade att studenternas *outlines* hanterades som något mer än en tidig version av en text. Att göra en outline explicitgjordes som en del av själva den studie som studenterna förväntades genomföra. Detta slags uttryckliga situationsöverskridande element pekar också mot att studenterna senare i processen kan göras ansvariga för att ha gjort just sådana handlingar som pekats ut. Vidare utgjorde dokumenten viktiga hållpunkter för att föregripa vad som kan kallas 'ett nästa steg' för texterna och därmed studenternas arbete med sin respektive fråga. Medan stora separationer som till exempel arbetsprodukt från arbetsprocess gjordes i relation till texter som var på ett tidigt stadium och där resonemanget ännu inte utvecklats, gjordes mera krävande distinktioner i förhållande till texter som var mer substantiella. I det senare läget separerades till exempel rapporterande förhållningssätt från resonerande, och normativa utsagor från argumenterande utsagor. Även detta fynd pekar på att lärarna successivt skärpte sina förväntningar på hur studenterna hanterade och förhöll sig till sina respektive frågor. Dessa fynd, hävdar avhandlingen, pekar på att den

## CHAPTER 7

komplexitet som frågor om hållbar utveckling innebär inte låter sig lånas till enkla förklaringar. Istället utgjorde just studenternas texter viktiga utgångspunkter för att lärarna skulle kunna öppna upp allt fler dimensioner av just denna komplexitet. Avhandlingen påpekar också att denna typ av guidning bör förstås som ett resultat av interaktionen i handledningen. Frågor av detta slag låter sig inte förmedlas på ett enkelt sätt.

Det ovan sagda pekar också vidare mot frågan om hur epistemiska praktiker kan förmedlas till studenter. Resultaten från de empiriska studierna i denna avhandling visar att lärarna introducerade alternativa handlingar på basis av vad de såg i studenternas texter. Exempelvis explicitgjorde en av lärarna i Studie 1 hur instruktioner i form av frågor inte innebar att dessa frågor skulle besvaras. Istället visades det på hur dessa frågor pekade mot sätt att närma sig kunskaper inom olika områden, och möjligheten för studenten att själv kunna skapa ett problem, dvs. just en så kallad *issue*. Ett annat exempel handlade om att en student behövde ha en egen agenda och formera just sitt eget problem, dvs. återigen sin egen fråga, för att kunna inkorporera slutsatser som andra kommit fram till i sitt eget resonemang (se Studie 2). Resultat som dessa pekar på att lärarna är viktiga samtalspartners i det att de kan tydliggöra alternativa förhållningssätt. Detta handlar dels om att peka på alternativ och andra perspektiv men framför allt om att arbeta med alternativa förhållningssätt och perspektiv så att studenterna kan erfara vad de innebär. Resultaten från studierna i denna avhandling implicerar att det är mycket krävande för studenter att brottas med och pröva detta på egen hand.

Den andra forskningsfrågan handlar om på vilka sätt frågor om hållbar utveckling ramas in och hur man svarar på dem. Sammantaget visar studierna att studenterna exponeras för en rad olika epistemiska praktiker och att dessa innebär utmaningar både för studenter och för lärare. Att vara i en tidig fas av en enkulturationsprocess, som dessa studenter är, innebär till exempel att man *använder* specialiserad terminologi och koncept med specifika innebörder, liksom avancerade och krävande procedurer, innan man har approprierat dem, dvs. innan man har gjort dessa till sina egna. Som nya inom fältet miljösystemanalys behöver dessa studenter resonera och argumentera i enlighet med en viss logik som kännetecknar frågor om hållbar utveckling inom detta område. För att ge frågorna en karaktär i enlighet med fältets intressen introduceras aktiviteter som t.ex. jämförelser och skapandet och användandet av trender och modeller som centrala element.

I mer konkreta termer introducerades till exempel konceptet *trend* som en utgångspunkt för att skapa frågor om hållbar utveckling. I relation till texter som var på ett tidigt stadium introducerade trender som en princip för att göra jämförelser mellan länder, mellan utsläppsnivåer och liknande och på så sätt närma sig olika frågor. I senare skeden av textproduktionen introducerade lärarna sätt att använda trender för att kvalificera ett resonemang och för att föra en substantiell argumentation. Här introducerades alltså konceptet trend som en praktik, vilken gradvis transformerade trender till epistemologiska operationer (eng: *devices*). Att göra och använda trender var alltså ett sätt att föra ett kvalificerat resonemang om en fråga för hållbar utveckling.

Utifrån detta drar avhandlingen slutsatsen att det problematiska med trender för ingenjörstudenter på masternivå handlar om att brottas med den situerade funktionen av fenomen som trender och att hantera vad som ligger bakom en trend, dvs. dess semiotiska dimension. På ett plan känner kanske just ingenjörstudenter till fenomen som trender ganska väl, men att hantera dem som situerade och konkreta fenomen i ett disciplinärt sammanhang kräver mer och framträdde i de empiriska studierna som en stor utmaning.

Vidare hävdar avhandlingen att detta exempel pekar på ett generellt problem inom högre utbildning vilket i sin tur också reflekterar nya typer av kunskap och kunskapsanvändning på en samhällslig nivå. Tvärs över hela det empiriska materialet finns en spänning mellan hur studenterna orienterade sig mot frågor om hållbar utveckling som något konkret som går att finna, och hur lärarna orienterar sig mot hur man skapar sådana frågor och hur de tar form. Jämförelser, trender och modeller var alltså mer än metoder för att hitta sådana frågor. De fungerade som processer genom vilka studenterna kunde lära känna fältet och dess premisser för hur sådana frågor skapas.

Avslutningsvis reflekterar avhandlingen över vad dessa resultat kan säga om vad det innebär att introduceras till den typ av vad som skulle kunna kallas heta frågor som hållbar utveckling innebär. Det kännetecknande för sådana frågor är t.ex. att de är politiskt laddade, att de innefattar olika intressen, och att människor vanligtvis uttrycker åsikter om dem. I det akademiska livet är det däremot inte tillräckligt att enbart uttrycka en åsikt utan åsikter måste grundas och föras i bevis steg för steg. Att förhålla sig kritisk och analytisk kan sägas ingå i det som i pragmatiska ordalag ofta benämns att akademiskt förhållningssätt. I materialet reflekteras ett sådant förhållningssätt genom att studenterna inte enbart ska visa att de har insikter om en fråga men också att de ska visa att de kan förhålla sig kritiska, analytiska och resonerande till

sådana frågor. Detta är kanske extra krävande inom ett område som är så laddat med olika intressen som hållbar utveckling. Ett sådant förhållningssätt kräver en form av distans som är svår att explicitgöra. Ett sådant förhållningssätt visar också på ett viktigt steg i en enkulturationsprocess.

Till sist görs följande konklusioner. Textligen medierad interaktion var en viktig faktor för att lärarna skulle kunna explicitgöra disciplinära sätt att hantera frågor om hållbar utveckling. I relation till texten kunde de packa upp detaljer och orientera studenterna mot handlingar och aktiviteter så att de kunde börja ta sig an den problematik som frågor om hållbar utveckling innebär. På basis av de tre studierna hävdar avhandlingen också att just handledningssituationen bidrar till att guida studenter in i att samtala med fältet. Genom att diskutera detaljerna i texterna orienteras de mot perspektivtagande, och mot att kunna inkludera och ta hänsyn till olika aktörer, s.k. *stakeholders*, och deras premisser i det egna resonemanget. En sådan orientering borde vara mycket krävande att göra på egen hand. Den verkar kräva tid, återkommande möjligheter och att gradvis pröva och brottas med alltmer konkreta aspekter av epistemiska praktiker.

Den intensiva interaktionen kring detaljer i studenternas texter ser ut peka på tre saker. Epistemiska praktiker är avancerade och svåra att förklara. Epistemiska praktiker är svåra att föra vidare. Epistemiska praktiker låter sig inte packas upp med hjälp av generella förklaringar utan kräver situering och konkretisering. Att formulera kunskap i den situation som avhandlingen studerar handlar om att delta i just sådana praktiker, dvs. att handla i enlighet med kunskapstraditioner inom fältet och att sätta dessa handlingar på pränt. Att modellera en fråga, att resonera och argumentera med hjälp av jämförelser och trender, att förhålla sig kritisk och analytisk är i ett utbildnings-sammanhang det samma som att visa att en enkulturationsprocess har ägt rum. Att använda statistik, att extrahera och transformera information, att skapa trender, att göra jämförelser, att använda specialiserad terminologi är exempel på praktiker som man kan appropriera. Sådana praktiker karaktäriserar många områden i ett modernt samhälle och är därför essentiellt för processer där man formulerar kunskap.





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# Appendix

## Sustainable Development

### Individual Assignments On Issues Of Sustainable Development

The work with the issues starts after an introductory lecture (6/9) and include input from some more lectures.

The titles for the individual assignment reports are selected to give texts usable as a necessary input to the solution of a problem that is going to be handled during the last week of the course. The handling of that problem will be dependent on the elucidation of various aspects of sustainable development. Your individual assignments will contribute to the solution of that problem. The titles will be grouped in three groups. Each will be presented on the morning of one day and discussed in groups on the same afternoon. The presentations will therefore last three days starting at Wednesday the 10:th of October.

The presentations of the assignments will last for approx. 20 min, including opposition and general discussion in the whole class, about 10-15 minutes of presentation and about 5-10 minutes for opposition and discussion. Each assignment will be opposed by two students, working with assignments from other groups of titles giving a "cross-linking" between the students specializing in different fields.

The text of the individual assignment is expected to be in the range of 60000 characters including spaces (about 15 pages Times New Roman 11p).

#### Individual assignments - instructions

**Audience:** The report should be directed to your class-mates, *i.e.* well-educated and interested individuals without very deep specific expertise in the subject area of the report.

**Aim:** The purpose of the report is to provide a good **survey of the title subject** so that the group will get a good overview of the subject that will contribute to the fulfilment of task of solving the later problem. The titles deals with both specific concrete subjects and with assessment methods or specific indicators. If you subject deals with a specific sustainability issue (e.g. agriculture, fisheries, water) the subject must be treated from a **sustainable development** point of view, taking **ecological, social, political and economic aspects** into account. The treatment of such subjects should include some aspects of **environmental measurements and/or other observations indicating the temporal trend of an environmental problem or aspect of sustainable development**, which is linked to your subject. Figures or graphs representing the present situation are a basis for management of the problems at hand therefore sustainability indicators should be considered.

In case your subject regards sustainability assessments *per se* or a specific indicator this instruction is invalid and you should search for other important aspects.

However, you are not expected to treat your subject from a purely technical or natural science perspective but link the kinds of knowledge you can get from these fields (science and technology) to the societal level. This also means that you have to take the **views of different societal actors** into account. Who are the relevant **stakeholders**? What interests are involved? Who has the **power** to change things? You should try to not just present one single view, but rather you should try to apply

**different perspectives** to the chosen subject and to see the problems involved from different angles in your discussion. Environmental problems have per definition to do with us human beings, what we do and what we don't do. This means that whenever we try to do something about impacts to the environment we must act through ourselves AND other people. But people are different; they hold different values, they have different attitudes towards risk-taking, towards our responsibility for future generation, towards the ethical status of other species and so on. So, in order to do something we have to be able to handle such differences. It is important that this is reflected in your paper.

Having presented different perspectives you should also try to compare and evaluate the different positions presented and **give a recommendation** that reflects **your own opinion** based on the **analysis** and **conclusions** of your text.

**Comment:** The aim must be interpreted in relation to the title given for the specific task. Everything should not, and cannot, be covered in all individual assignments. You have to judge what is reasonable and feasible to cover in your specific individual assignment. Covering too much is as wrong as covering too less.

The report is expected to be in the range of 60 characters including spaces (about 15 pages Times New Roman 11p) and shall follow the general requirements of a formal report (front page, author, pagination, table of contents, references in the text, and so on). This also includes the originality of the text. **Plagiarism is not allowed under any circumstances.** This means that "copy-and-paste" from web-sites, pdf-documents, web-pages or direct citation of paragraphs from books, articles etc is forbidden. Sources must be treated with proper paraphrasing and adequate citations. Since your individual assignment is part of the examination of the course any violation of this rule is also a violation of the examination rules of the university and will be treated according to university regulations.

## Population - boon or bomb?

Despite a long history of dire prediction, the human population is still rapidly increasing. There are many points of view related to the population issue; for instance, growth means that more people can work and contribute to development but also that more demands have to be fulfilled. Research has clearly identified correlations between the fertility rate of a country and indicators of its social development such as its Human Development Index (HDI), but in which direction is the causality? How does population growth behave as a driver for the parameters from which the HDI is derived? How does this relate to the more direct effect that population increase has on resource demand? How can we achieve a stable population? Will that be enough?

### Information Resources (examples)

UN Population Fund [www.unfpa.org](http://www.unfpa.org)

Paul R. Ehrlich; John P. Holdren. *Impact of Population Growth* Science, New Series, Vol. 171, No. 3977. (Mar. 26, 1971), pp. 1212-1217.

Wolfgang Lutz, Warren Sanderson & Sergei Scherbov. *The End of World Population Growth*. NATURE | VOL 412 | 2 AUGUST 2001

## What are the constraints of a sustainable energy future?

The search for sustainable energy will be a dominant theme in the 21<sup>st</sup> century. It will be a difficult task; all energy production methods have drawbacks, and developing countries will surely place huge additional demands on the energy system. What must happen for our energy system to be sustainable? Are there limits to its supply? How is energy demand likely to evolve? How can supply meet demand in a manner that can be sustained? What does this imply for necessary energy strategies in the developed and developing worlds?

### Information Resources (examples)

International Energy Agency [www.iea.org](http://www.iea.org)

Rubens A. Dias, Cristiano R. Mattos, Jose A. P. Balestieri. *The limits of human development and the use of energy and natural resources*. Energy Policy 34 (2006) 1026–1031

Ibrahim Dincer, Marc A. Rosen. *A Worldwide Perspective on Energy, Environment and Sustainable Development*. Int. J. Energy Res., 22, 1305- 1321 (1998)

## Towards sustainable consumption

Consumption is a basic requisite of life, yet it is clear that many of our consumption patterns and choices can not be sustained. Indicators can help us distinguish poor choices from good ones but still need to be communicated to us to be effective. By what means and by who? Are there entire classes of goods or services that are unsustainable? By what means can we change consumption patterns? If we can only consume from an unsustainable set of things, can our choices have an outcome? Can sustainably minded consumption lead to sustainable production?

### Information Resources (examples)

IISD [www.iisd.ca/consume/overview.html](http://www.iisd.ca/consume/overview.html)

UNESCO [www.unesco.org](http://www.unesco.org)

Oksana Mont, Andrius Plepys. *Sustainable consumption progress: should we be proud or alarmed?* Journal of Cleaner Production xx (2007) 1-7

Harald Throne-Holst, Eivind Stø, Pa<sup>o</sup>l Strandbakken. *The role of consumption and consumers in zero emission strategies.* Journal of Cleaner Production 15 (2007) 1328-1336

## Acceptably clean air

Air quality is an environmental concern with profound impacts on human health. The sources, chemistry and effects of aerial pollution are complicated. What are the most relevant forms of pollution and what activities do they come from? Is it the same answer in the developed and developing world? How are acceptable levels of pollutants decided and air quality measured? How can pollution be tracked and how does this affect efforts to reduce it? Will air quality get better or worse?

### Information Resources (examples)

European Commission <http://ec.europa.eu/environment/>

Thomas M. Selden. Environmental Quality and Development: *Is there a Kuznets curve for air pollution emissions?* Journal of Environmental Economics and Management 27 (1994)

Wan-Li Cheng, Yu-Song Chen, Junfeng Zhang, T.J. Lyons, Joy-Lynn Pai, Shiang-Hung Chang. *Comparison of the Revised Air Quality Index with the PSI and AQI indices.* Science of the Total Environment 382 (2007) 191–198

## What does sustainability mean for future transport?

The demand for transport of people and goods represents a major use of energy and production of pollution. Therefore there will be immense environmental pressure to either reduce the amount of environmental impact of transport service, or the total demand for it. How has the demand for transport service historically changed with development, and what implications does this have? What are the environmental impacts of transport and how can they be reduced? Can they be reduced far enough to find a balance between environmental realities and demand?

### Information Resources (examples)

International Energy Agency [www.iea.org](http://www.iea.org)

Lee Chapman. *Transport and climate change: a review.* Journal of Transport Geography 15 (2007) 354–367

David L. Greene, Michael Wenger. *Sustainable Transport.* Journal of Transport Geography Vol. 5, No. 3, pp. 177-190, 1997

## Food and land-use - will there be enough land to feed our children?

Agricultural production is a basic prerequisite for human life. This production has kept pace with the increasing population for the last half century despite an unprecedented increase of the human population. How was that possible? Will that be possible in the future? Which are the possible ways out given the uneven geographical and social distribution of means of production, economical constraints and natural conditions? And what about the challenges raised by the climate change?

### **Information Resources (examples):**

<http://www.fao.org/>

Dyson T, 1999, World Food Trends and Prospects to 2025, Proc. Natl. Acad. Sci. USA 96:5929-5936. <http://www.pnas.org/cgi/reprint/96/11/5929.pdf>

Harris JM 2001 Agriculture in a Global Perspective, Global Development and Environment Institute Working Paper No. 01-04.

[http://ase.tufts.edu/gdae/publications/working\\_papers/agric4.workingpaper.pdf](http://ase.tufts.edu/gdae/publications/working_papers/agric4.workingpaper.pdf).

Ludwig F, Asseng S 2006. Climate change impacts on wheat production in a Mediterranean environment in Western Australia. *Agricultural Systems* 90(1-3): 159-179.

United States Department of Agriculture. 2007. Grain: World Markets and Trade. Foreign Agricultural Service Circular Series. Available from:

<http://www.fas.usda.gov/grain/circular/2007/04-07/graintoc.htm>

Steinfeld et al 2006. Livestock's long shadow - environmental issues and options, Food and agriculture Organisation of the United Nations, FAO, Rome.

## Are present marine fisheries sustainable?

Fish is an important source of protein and calories and abundant in human food. The huge ocean production is to a large extent exploited and there are several examples of so called "commercially extinct species" and fisheries that have decreased. However the seas are not empty, future fishing is possible given that some restrictions are implemented. What restrictions and how to implement them have been and is much debated. Which are the facts - trends, present status and threats - regarding fisheries, which use a natural resource without easily applied ownership? How is it managed considering the dilemma of the "tragedy of the commons"? What is done, what should be done and what can be done?

### **Information Resources (examples):**

FAO Fisheries and Aquaculture Department 2007, The State of the World Fisheries and Aquaculture 2006, Food and Agriculture Organization of the United Nations, FAO, Rome.

<http://www.fao.org/docrep/009/A0699e/A0699e00.htm>

Hardin G (1968). Tragedy of the Commons. *Science* 162(3859): 1243

Utne IB (2007). System evaluation of sustainability in the Norwegian cod-fisheries. *Marine Policy* 31(4): 390-401.

## Are the present patterns of production sustainable?

Human life is founded on the satisfaction of some basic needs. Food, water, fibres, shelter and so on. The global production and consumption system we are parts of provides these basic needs in order to give us the possibility to survive. Due to population increase and a better

material standard of living the resource use have expanded due to a much increased total consumption. What are the main patterns of this consumption and production sketched by broad lines? Which are the trends and which are the differences between different countries and social groups? What can be a sustainable production? Which are the means to achieve that?

**Information Resources (examples):**

<http://www.zeri.org/>

Baas L (2007). To make zero emissions technologies and strategies become a reality, the lessons learned of cleaner production dissemination have to be known. *Journal Of Cleaner Production* 15(13-14): 1205-1216.

Fresner J, Schnitzer H, Gwehenberger G, Planasch M, Brunner C, Taferner K and Mair J (2007). Practical experiences with the implementation of the concept of zero emissions in the surface treatment industry in Austria. *Journal Of Cleaner Production* 15(13-14): 1228-1239.

Sokka L, Antikainen R and Kauppi PE (2007). Municipal solid waste production and composition in Finland - Changes in the period 1960-2002 and prospects until 2020. *Resources Conservation And Recycling* 50(4): 475-488.

## Will there be enough water?

Water is fundamental for humans and ecosystems. But urbanisation, industrialisation and other processes has caused a range of environmental issues, depending on geology, land use, level of industrialisation and development, interventions made in traditional ways of managing water etc. An upcoming 'water crisis' is one of the major environmental problems of this century, assumed to create new and worsen the present conflicts around water. What is the water situation in different parts of the world in terms of water availability and water-related environmental issues? What is the trend? What are the drivers for increased water related problems? What are the challenges? Suggested measures? Will there be enough water to feed a growing world population?

**Information Resources (examples):**

UNESCO Water Portal: <http://www.unesco.org/water/>

Institute for Water Education: <http://www.unesco-ihe.org/>

Food and Agriculture Organisation of the United Nations: <http://www.fao.org/>

World Resources Institute: <http://www.wri.org>

The World's Water: <http://www.worldwater.org>

WHO: <http://www.who.org>

Falkenmark M, R. J. (2005). Balancing Water for Humans and Nature: The New Approach in Ecohydrology. London, UK, Earthscan.

Huntington, T. G. (2006). "Evidence for intensification of the global water cycle: Review and synthesis." *Journal of Hydrology* 319(1-4): 83-95.

Rijsberman, F. R. (2006). "Water scarcity: Fact or fiction?" Agricultural Water Management



## Is democracy necessarily a part of Sustainable Development?

Is democracy important? Is it needed for development? This topic is about an examination of democracy and its relation to development and human rights. Since democracy relates to how societies are organised and ‘governed’ and to issues like freedom of speech, the area of study span from individual level to international and even global level.

What is democracy? How is it formed? How does it relate to development and human rights? What means a democratic governance system? Could there be a tension between democracy and development-related societal goals? Could there be any conflicts of interest between democracy and different interpretations of Sustainable Development? What is the role of democracy in environmental/sustainability assessments?

### **Information Resources (examples):**

Office of the United Nations High Commissioner for Human Rights (formerly known as UNHCR): <http://www.ohchr.org/english/>. Some informative reading about Democracy and Human Rights at: <http://www.unhchr.ch/democracy/index.html>

UNDP: <http://undp.org>

Lundqvist, Lennart J. (2004) Sweden and Ecological governance: Straddling the fence. Manchester University Press. Chapter 6, 7, 8.

Mather A.S. and Needle C. L. (1999) Development, democracy and forest trends. Global Environmental Change 9 (2) pp. 105-118

Söderbaum, P (2007) Issues of paradigm, ideology and democracy in Sustainability Assessment. Ecological Economics 60 (3) pp. 613-626

UNDP (2006) Governance for the future: Democracy and Development in the least developed countries

## Is trade always good?

For many decades trade has increased along with urbanisation, industrialisation, growing markets and specialisation with low transport costs as an important factor, in turn because of the availability of fossil fuels. This has driven the development in both positive, but maybe also negative, ways for the countries involved in trade, among other things because trade also have several environmental effects and is connected to development. What are the drivers of trade? What is the historical trend of trade? How is trade linked with development? What are the environmental effects of trade? What ‘actors’ have a role in controlling trade between nations, in regions and at global level and what means do they have to govern trade related environmental issues? What environmental effects may occur from changes in the institutions of trade, like free trade arrangements? What is the potential for concepts like “fair trade” (FSC, Max Havelaar, etc.) to make a significant contribution to Sustainable Development?

### **Information Resources (examples):**

OECD: [www.oecd.org](http://www.oecd.org)

WTO: [www.wto.org](http://www.wto.org)

UNCTAD: [www.unctad.org](http://www.unctad.org)

Cole M. A. (2006) Does trade liberalisation increase national energy use? Economics Letters Volume 92 (1) pp. 108-112

Copeland, B.R., Taylor, M.S. (1994) North-South trade and the environment. Quarterly Journal of Economics Volume 109 (3), pp. 755-787

International Policy Council (2005) Specific Environmental Effects of Trade Liberalisation: Oilseeds. IPC Issue Brief October 2005  
Peters, Glen P. and Edgar G. Hertwich (2006) Pollution embodied in trade: The Norwegian case. *Global Environmental Change* 16 pp. 379–387  
Vennemo H., K. Aunan (In Press) Environmental Impacts of Chinas WTO accession. *Ecological Economics*

## How are urban physical structures and sustainability linked?

A growing global population are moving into cities resulting in several challenges for the cities receiving the migrating humans. The purpose of this topic is an investigation of the chances of the 'city' as a means to reach sustainability. Is it at all possible for a 'city' to be sustainable?

What is the trend for urbanisation – the concentration of people in urban environments or cities? What is the driving forces? Which are the consequences and possibilities related to a quickly growing urban population from a sustainability point of view? Which is the physical structure of the large cities of our world (population density distribution, infrastructure localisation, housing, means of transportation etc)? Which are the trends? Which are the challenges? Which are the remedies?

### **Information Resources (examples):**

UNHABITAT United Nations Human Settlements Programme: <http://www.unhabitat.org/>

United Nations Development Programme: <http://www.undp.org>

WHO: <http://www.who.org>

International Council for Local Environmental Initiatives: [www.iclei.org](http://www.iclei.org)

Frannie Léautier (editor) (2006) *Cities in a globalizing world: governance, performance and sustainability*. Washington, DC: World Bank

Rees, William and Mathis Wackernagel (1996) *Urban Ecological Footprint: Why cities cannot be sustainable – and why they are a key to sustainability*

## How is national sustainability assessments performed?

At the national level sustainable development can be assessed in 192 different ways (the number of member nations in the UN). Several sets of sustainability indicators have been suggested (see International Institute for Sustainable Development), and some of them are used both internally and for international comparisons. Which are the similarities and differences between large and small, developed and developing countries regarding the coverage, the procedure and the systems built to assess sustainable development? How are national perceptions and preferences reflected in the assessments? Choose some concrete examples!

### **Information Resources (examples):**

<http://ivm5.ivm.vu.nl/sat/>

<http://www.iisd.org/measure/compendium/>

Pintér L, Hardi P and Bartelmus P (2005). *Indicators of Sustainable Development: Proposals for a Way Forward*, International Institute for Sustainable Development.

## How is sustainability assessments performed at the city/municipal level?

There are huge differences between different cities or municipalities - some are megacities while some are only smaller towns. However, in urban areas there are public authorities with power to directly decide on several aspects of the development of the city, including responsibility for environmental conditions. Assessing sustainability on the city or municipal level in order to increase the sustainability of the local system has a relatively long tradition. Seattle on the American west-coast was one of the first examples. How is the concept of sustainable development understood and handled? Are assessments performed? How? By whom? Are participative approaches used and frequent? Which are the international organisations supporting sustainability work on this organisational level? You should choose some concrete examples in order to illustrate similarities and differences between cities.

### **Information Resources (examples):**

<http://www.sustainableseattle.org/>

<http://www.iisd.org/measure/compendium/>

Ravetz J (2000). Integrated assessment for sustainability appraisal in cities and regions. *Environmental impact assessment review* 20: 31-64.

Wiek A and Binder C (2005). Solution spaces for decision-making - a sustainability assessment tool for city-regions. *Environmental Impact Assessment Review* 25(6): 589-608.

