

The writing experience of Swedish industrial doctoral students: implications for writing tasks in the university

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Abstract

The paper asks what the role of writing in the university might be in preparing students for writing in the engineering workplace. It reviews literature suggesting that although they use similar formats and mediating tools such as diagrams and equations university tasks are often essentially different from workplace ones. The roles and aims of writer and reader are very different, and the university cannot reproduce the conditions of workplace writing.

It examines this conflict by looking at a new group, who are moving back into academe from the workplace rather than in the other direction: *industridoktorander*. Interviews with ten of them revealed conflicting evaluations of conference types, and differences in many aspects of report writing, such as focus on results or method, reporting of failures, medium for communication of findings, degree of linguistic explicitness and precision, existence and function of gatekeepers.

These differences and potential conflicts were not experienced as irritating or difficult.

The conclusion is that writing in the academy cannot reproduce conditions in the workplace and that along with careful development of appropriate research and learner genres, engineering educators should try to develop an awareness of the communities of practice that these genres are embedded in, so that future engineers are aware that genre requirements are not mere conventions, but arise from text function and purpose.

Discussion questions for the presentation

- What skills might be transferable from learner and academic research genres to professional writing?
- What necessary skills cannot be acquired by writing learner or academic-research genres?
- What sort of writing tasks in what language are useful **for learning** at the Bachelor's, Master's, and doctoral levels?
- What sort of tasks are useful **for professional-writing training** at these levels and is there any room for tasks with that aim at any of these levels?
- How far is it the role of the university to acquaint engineering students with professional genres and writing conditions? How far is it possible to do this?

Introduction

Engineers often say they know reports are important but they don't like writing them. Managers often say that their subordinates cannot write reports (though this is such a universal complaint that one may suspect that power plays a role, and dissatisfaction with subordinates' writing sometimes merely transfers the managers' own difficulties downwards). Consequently a common complaint is that engineering students do not

write enough in their university education and that universities should do more to train them.

Universities often respond to this by increasing the amount of writing in academic courses – asking students to make written presentations of projects or asking for research-article type writing on Masters courses. Artemeva, Logie and St Martin described a course they devised in these terms: “ The major goals of this course are to facilitate the acquisition of rhetorical skills and strategies necessary for students to successfully integrate into their engineering school environment and to facilitate their transition to the workplace. These skills and strategies are acquired through typified writing practices in situated contexts of the engineering discipline, interactions with existing texts, and interactions with relatively experienced writers (engineering students from upper years, teaching assistants, and instructors).” It is clear that this is a course aimed at writing in the academy. A recent and very valuable dissertation (Hållsten 2008) and an eight-year longitudinal study (Artemeva 2007) have provided detailed case studies of the relationship of the writing tasks required in engineers’ professional lives and that required in their academic training. They show rather clearly that the academy requires one set of types of writing and industry another. The genres students write at university are learner genres which may or may not be helpful antecedents (Devitt 2007) for professional genres. Learner genres function to enable students to acquire and deepen disciplinary knowledge, and as evidence that they have done so. In these genres, power, knowledge of content and disciplinary values, and communicative skill are all in the audience's hands. The text is autonomous – the teacher sits alone and grades, in engineering classes often with no dialogue with the writer at all. The action intended – setting a grade – is entirely in the hands of the knowledgeable, powerful and skilful partner. It is thus not surprising that teachers emphasize the importance of meeting the audience's expectations.

In professional genres, power, knowledge and communicative skill are distributed in varying proportions among the actors. When an expert writes a report for a manager, for example, the knowledge and the power are broadly speaking on opposite sides. It is assumed that writers know what they are talking about and no one judges this, only the success of the solution suggested. As Hållsten (2008:210) says “Att man kan det man skriver är självklart och behöver inte redovisas” Furthermore, professional texts are embedded in a matrix of shared drafts, emails, phone calls, chats, and the written product is rarely the sole bearer of its purpose. The action intended by the text is complex, formed by the community in which the document is written, and requires multiple decisions. This can result in conflicts among actors. So engineers often fail to see the complexity of the situation and focus on what they want to see done, leading to managers’ complaints that they do not consider the reader enough.

One would hope that the objects of “the learning activity in the school (the theories, laws, methods, tools, and other artifacts of the profession) become ‘mediational means’ in the workplace” (Le Maistre and Paré 2004 p. 45, cited in Artemeva 2007). That is, things learned for their own sake in the classroom become available as tools in the workplace. But this is not a simple transfer. Using workplace genres is a matter of acquiring the identity of a workplace participant and perceiving the conditions of production and power

relations typical of this environment. This may not be easy, since professional genres are very different from learner genres in this respect.

For example, Abbott and Eubanks (2005) found that academic writing teachers based their judgements of text quality on general principles like providing topic sentences, while practising engineers made similar judgements but on the basis of “speculations about the particular context and the effect the memo might have” (201). Interestingly, Forey (2004) found that people working in business paid more attention to the ideational than the interpersonal features of a text and their primary concern was with clarity rather than the hectoring tone which struck teachers. Teachers and (linguistic) researchers may, says Forey, be overly sensitive to linguistic choices, or at least may have a discourse for talking about texts which highlights these. Parks (2001) found that nursing students were taught at college to write care plans in an explicit way as if for public consumption, but once they were in the community of practice they learned to write less explicitly, saving effort and assuming shared knowledge. Here again there was conflict in the real-world environment. Senior staff visualized a wider audience for the plans; the more implicit versions were “bad habits”.

There has been much discussion of the workplace-classroom opposition (Artemeva 2007), viewed as part of a process where writers move from the university out into industry but there are a number of interfaces where writers are not moving from one community into another, but are temporarily part of both. One is the *ex-jobb* described by Hållsten, in which dissertation writers may be faced with conflicting rhetorical demands and interpretations of their task from the company and the university supervisor. Another is undescribed but capable of providing interesting insights into the nature of writing in the two communities, and that is the status of *Industridoktorand* and that is what is investigated here.

This paper reports an investigation into the relationship between academic and industrial research reporting, as perceived by engineers working in both fields simultaneously. *Industridoktorander* are employed by a company but working on an academic project. They typically spend three or four days a week at the university and one or two in their company, even if they are mainly working on their PhD project in both environments. They do not teach and are not novice academics being drawn into that community of practice. Their aim is rather to acquire expertise which will be valuable to their company, but also of course to acquire academic accreditation for themselves. So they are at the professional/research interface

Method and subjects

I contacted a convenience sample of 10 *industridoktorander* and arranged to interview them, four at their company and six at the Royal Institute of Technology, Stockholm. Nine were men, one a woman, and eight came from one large Swedish-owned vehicle manufacturer, one from another large US-owned manufacturer and one from a small vehicle engineering company owned by UK financial interests. Nine were L1 speakers of

Swedish, one of German. They were at varying stages of their academic and industrial careers, with from a few months to ten years' employment in their companies and from a few months to four years of doctoral work. All were employed in research and development departments; the small company specialised in this area. Their work in companies was typically not as members of closely-knit project development teams, but as experts on a particular narrow area, who might be consulted and asked to carry out tests on prototypes or parts under development by a number of such teams.

The interviews lasted between half an hour and forty-five minutes. I took notes and recorded on an MP3 recorder. The interviews were semi-structured – based on a schedule of questions (Appendix), all of which I obtained answers to, but which I added to where appropriate. Five interviews were conducted in Swedish and five in English, since all participants claimed they were willing to use either language. In practice the company environment encouraged the use of Swedish, the university that of English.

Results

Genre repertoire

The interview technique is clearly better for eliciting fairly formal written genres than occluded or oral ones. Subjects needed prompting to elicit e-mail, telephone conversations, etc. The genres they mentioned can be categorised as business, educational, and research. In the first category most of them only perceived themselves as producing minutes of meetings. Only the subject who worked in a small company produced a full range of genres, including tenders, product documentation, etc. Educational genres consisted of coursework assignments at the Royal Institute—problem solutions and presentations, for example. Research genres were produced in both environments. In the university they produced theses – the licentiate waystage and the actual doctoral dissertation – conference papers and journal articles. Most doctoral theses were or were to be compilations of published articles with an introduction creating some sort of unity, but even where the thesis was to be a monograph, conference papers and articles played a large part in writing at the university. In the company research or testing work was reported in such genres as technical reports, specifications, standards, technical requirements, system descriptions, and again conference papers. Here I focus on technical reports and conference papers in the company and articles and papers at the university.

Language choice

While most oral interaction at the Royal Institute is in Swedish unless foreigners are involved, at the doctoral level all writing and nearly all reading is in English, both for educational and research genres. One subject said "Here at the university there are so many foreigners that it's natural to do it in English, but at the company it's natural to do it in Swedish". All interviews were conducted in the language I initiated them in (although I offered the choice), and it also seemed natural to me as an L1 English speaker to initiate in English at the university and in Swedish at the company.

There was more variety in language choice at company level. The subjects said that if they were presenting at a professional conferences, like that of the Society of Automotive Engineers in Detroit or a European equivalent they would of course do so in English. In

the small UK-owned specialist engineering company everything is written in English, apparently primarily because most customers are abroad, but also so that the owners can know what's going on. In the large US-owned vehicle company the policy was that everything should be in English, but in practice about half the documents were produced in each language. Where the audience was to be purely Swedish, it would be silly to write in English, my informant said, and hinted at another factor: "I wrote one document in Swedish so the Americans wouldn't steal the idea". In the Swedish-owned company, Swedish was the default language although English was allowed and officially the company was bilingual. One new employee thought English was the company language, all others wrote mainly or wholly in Swedish (with English terms and acronyms). The discourse of this environment is typified by the quotation. "We have an Englishman working for us and he writes in English": English is the exception not the rule.

Conference systems

Most of my informants attended two or three kinds of conference: academic, professional, and sometimes user group. The academic conferences were primarily attended by university researchers and most highly valued by them. Professional conferences, like that of the Society of Automotive Engineers in Detroit or a European equivalent, were primarily attended by industrial developers and researchers and attendance or presentation gave little prestige to academics, although some often attended them. By contrast academic conferences were seen as pointless within industry and professional conferences were very important. Even the large companies valued the attention their employees' work would get on these occasions, and for the small-company employee attendance and presentation was essential publicity. User groups for experts applying particular computer programs were opportunities not only to learn but to display one's achievements and acquire a reputation among both industrial and academic experts: they offered discussion with peers, many of them senior and influential.

Summary: perceptions of two overlapping discourse communities

The interviewees expressed fairly uniform views on many aspects of the difference between writing in their two locations. They agreed in perceiving a sharp difference in the genre hierarchies of the two environments. For the university, journal articles were clearly the most valued with academic conference papers next and professional conference papers nowhere, because the peer-review systems involved provided a guarantee of quality. By contrast the papers at professional conferences were most respected by companies, because their message would "reach powerful people", although written products in general were less central.

In terms of content, academic writing was perceived as requiring a much more rigorous selection of material. "In your articles you only support successful experiments, no one is interested in failure, but in the company you've got to report everything, successes and failures are equally important". This relates to differences in imagined audiences. The academic paper is designed for insertion at a certain moment in the conversation of the discipline and honed to make a specific point. By contrast the written industrial test report was perceived as an archival resource which might be consulted for any purpose and in any context. Consequently it was important not to be selective but to report the

success or failure and results of all tests. Moreover academic articles required a detailed description and justification of methods, while in industry their expertise was less under scrutiny and the focus was more on the results. Another way of putting this was to say that the exact testing procedure was what mattered at the university while in the company it was important to specify exactly which part was being tested.

Style was perceived as differing too. Writing at the university one had to weigh every word. Claims had to be more elaborately hedged and it was important to say exactly what one had evidence for and no more. At the company, they suggested, one could rely on people knowing what was intended.

Subjects thus perceived academic writing as involving more rhetorical effort (perhaps especially because it is more decontextualized) than technical reports. One can imagine that the move from the contingent repertoire of everyday discussion of scientific activity to the objectivized prose of the academic report (Gilbert & Mulkay 1984) At least one complained that different attitudes to writing and the rhetorical effort required were reflected in writing time being budgeted for at the university but forgotten at the company.

Several informants expressed this greater rhetorical effort by saying that academic writing was more formulaic and writing in the company more free. Although one also hears the complaint that at other companies communication is too much restricted by templates, (although Hållsten did not find this anywhere) but in this context it presumably means that writing for academic publication requires close adherence to an IMRaD or other conventional sequence, while in the industrial test report one can more or less tell one's own story.

The process is different too. Interviewees noted that in the academy the final text is a primary means of communication which is autonomous and must speak for itself. By contrast, in industry by the time one writes the report one has already informed all those who are primarily concerned orally or by email or a Powerpoint presentation. While it is not their discourse to put it like this, one could say that the difference lies in the roles of the immediate and ultimate audiences. At the university the engineer does tests and discusses the results with immediate colleagues, the supervisor, etc. The group then sets about producing, more or less collaboratively, a text which will isolate the issues that are important in a disciplinary sense and present them to the important but relatively faceless public audience of the journal or proceedings volume who will, we hope, incorporate this insight in their thinking and research. In particular the article has to pass the scrutiny of referees from a different environment and possibly with different backgrounds. In the company too, one tests and then discusses the results with colleagues and those who commissioned the tests. This is not, however, mere preparatory activity, but actually the process of reporting to the important audience. Then the tester starts, generally alone, to produce a text which will be a record of the results for the faceless and potentially non-existent audience of later company researchers who need some of this information for an unknown purpose. If anyone acts as a critic of the text it is a senior person in the same workplace with shared knowledge of local practices and conditions.

The issue of audience in the company was one where rather different attitudes were expressed, again perhaps reflecting the less formalised rhetorical situation. Some informants tended to doubt whether there was an audience for archived reports at all, thinking that anyone who needed the information would find out who had written the report and and ring him or her up to find out what it said. But several others thought that archived reports were an important resource due more attention than they generally received. The following dialogue (translated from Swedish) illustrates this:

Interviewer: *Who's going to read these reports?*

Subject: The people involved in the actual construction and whoever has my job after me. I've had lots of information from old reports that people wrote before me

I: *Do you inform people before the report is finished?*

S: Yes I send/present something preliminary to those who are absolutely interested and the final report to everyone who might be interested

I: *Aren't these archived reports just dead paper that no one reads?*

S: In electronics no one is interested in what happened ten years ago, but in my field it's not like that. I can read reports from the seventies and get something useful from them. I've learned a lot from old reports.

Implications for engineering education

I would like to end the paper by suggesting my answers to the questions I posed at the beginning.

- What skills might be transferable from learner and academic research genres to professional writing?

Schryer defines genre (2000:450) as a constellation "of regulated, improvisational strategies triggered by the interaction between individual socialization... and an organization" (p.) and both Artemeva's and Hållsten's studies show that while some of the strategies involved in learner task are not transferable, some are, and the teacher's job is to make the student aware of the situated nature of learner genres to make it possible for students to choose strategically in new situations. One might suggest that strategies like the general shape of a report, good composing practices, correct technical English and Swedish, and above all the idea that the text is intimately affected by the situation's demands, and that these will vary, are transferable.

- What necessary skills cannot be acquired by writing learner or academic-research genres?

Untransferable strategies might be: choosing the language (English or Swedish), placing responsibility for decisions appropriately, guiding a superior to the desired decision, judging what details the superior needs to know and which the writer thinks he/she ought to know?

- What sort of writing tasks in what language are useful **for learning** at the Bachelor's, Master's, and doctoral levels? What sort of tasks are useful **for**

professional-writing training at these levels and is there any room for tasks with that aim at any of these levels?

Writing tasks which lead students to express their thinking explicitly and to be critical, and to document sources etc. so that they can receive feedback and improve are good learner tasks. Professional-writing tasks would have to be written to solve a problem not to display skill, and would therefore not have to be directed to teachers. Perhaps co-operation on some projects could require unevaluated written 'expert' documents, either circulated among members of the task group or, better, archived and so organised that future writers are forced to follow up.

- How far is it the role of the university to acquaint engineering students with professional genres and writing conditions? How far is it possible to do this?

This is not a question for an applied linguist!

Acknowledgements

This research was financed by the funds for my guest professorship at KTH and a visit to the 4th International Symposium on Genre Studies generously funded by KTH Language Unit and Stockholm University English Department.

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