A PHENOMENOLOGICAL INVESTIGATION INTO UNDERGRADUATE STUDENTS' EXPERIENCE OF ACQUIRING THE DISCOURSE OF ENGINEERING

Dissertation submitted in fulfilment of the requirements for the degree

Doctor of Philosophy

by

Karen Ilse van Heerden

Rhodes University, Grahamstown
Education Department
December 2000

ABSTRACT

The area of discourse acquisition and writing in higher education has become a much researched field. In South Africa the interest in discourse acquisition and writing has been partly in response to the change in student profile, particularly over the past ten years. While South African researchers and academics are increasingly focusing their interest in discourse acquisition and writing on the unique circumstances here, they rely on theories based on research done in very different social contexts. These theories are not necessarily universally appropriate. South Africa is currently undergoing a period of transformation in higher education aimed at greater access and equity for black students and academics. The accompanying sense of frustration and disillusionment among students and academics underlines the need to reappraise all aspects of higher education.

Much of the research on discourse acquisition and writing is undertaken in arts programmes: vocational fields – such as engineering education - tend to be neglected. If the envisaged growth in science and engineering education is to be realised, it is essential that research in discourse and writing be undertaken in engineering programmes.

This study investigates discourse acquisition as experienced by students in a South African engineering faculty. The experiences of six final year technikon students are investigated to gain a better understanding of what it means to acquire the discourse of engineering. The phenomenological method used requires that the researcher suspends or brackets *a priori* theoretical notions or pre-conceptions so that that which the students experience, rather than what the researcher expects in terms of theory, can emerge.

What emerges from the students' experiences is partially congruent with established discourse and writing theories. However, some of the student experiences of discourse acquisition differ in significant ways from what is described in mainstream writing and discourse acquisition theory. The differences in the manner in which these students experience their acquisition of engineering discourse leads to a new understanding of the

phenomenon. The students do not experience the alienation or struggle described in mainstream theoretic accounts of discourse acquisition. Students' approaches to writing are affected by their awareness of their multiple identities and the different locations in which they learn. Their approaches to writing are significantly different in some respects from descriptions in mainstream theories in some respects.

The description of their experiences gives a different understanding of what it means to acquire the discourse of engineering, and may contribute to the reappraisal of engineering education in a contemporary South African context.

ACKNOWLEDGEMENTS

Many people have helped and encouraged me, and made this study a deeply satisfying experience both professionally and personally. My sincere thanks to:

- The six student participants for their generosity and frankness;
- Hennie van der Mescht, my supervisor for introducing me to phenomenology, for always making me believe I could do this study, and for always responding quickly;
- George Euvrard, my co-supervisor, for his guidance and encouragement in initiating my study;
- Chrissie Boughey, an esteemed researcher and practitioner, for reading and commenting on chapter two;
- Sally Potgieter, a good friend and colleague, for taking on additional responsibility while I was on sabbatical;
- My colleagues for their encouragement and interest;
- The Port Elizabeth Technikon for granting me a year's sabbatical and financial assistance to complete my study;
- Jenny, my daughter, for helping me edit, for making my life easier in many ways when I needed help, and for her wonderful encouragement and understanding;
- Thomas, my son, for his sense of humour and patience in helping me with the computer;
- Derick, my husband, who has given me the inspiration and opportunity to pursue my studies, and whose presence in my life has been enriching and supportive over many years.

TABLE OF CONTENTS

Chapter One

Introduction

The academy has a limited tolerance for lived experience.
(Brodkey in Chiseri-Strater 1991: xii)

A warning and a challenge. I begin with my experience.

1.1 Experience, pre-conceptions and interests

I have been teaching engineering students to write as professionals for twelve years. But I am not an engineer. I am a language teacher. It is not uncommon in engineering programmes that writing is taught by an outsider, someone not included when students talk of 'our faculty'.

It took a while for me to notice this distinction the students make, but once I had noticed it, it began to worry me. I became increasingly aware of my lack of understanding of engineering concepts basic even at first year level, and tried to find out at least a little about industrial engineering. I've learnt: 'Just-in-time', 'world class manufacturing', 'KANBAN'. But even when I could hold my own among the students with what I knew of such things, I was still not included in 'our faculty'. And there's the rub. They will always see me as a language teacher, somebody outside the realm of engineering.

My awareness of their perception of me was the germ of this study, for it pointed also to my lack of understanding of their experiences. I don't know what it means to experience 'becoming an engineer'. I'm not an engineer – I have not myself experienced acquiring the discourse of engineering. My understanding of engineering is peripheral – from an outside perspective. My understanding of discourse acquisition is theoretic – from reading and attending conferences.

My readings of others' research and theory somehow always created a vague sense of inadequacy and inappropriateness. I was looking at research and theory firstly as a teacher in a context where the 'massification' of higher education was a national and institutional aim. Theory seemed to make sense while I read, but not in my classroom. In my experience as a writing teacher, students had a more pedestrian approach to writing than that described in theory. The student writing I saw showed little awareness of rhetorical issues, or of writing as a social practice within a discourse community. Despite the inventive and enthusiastic efforts of the team of presenters with whom I offer the course, we battled to get students to engage with rhetorical issues in their writing. We explored more and more options – each presenter having a favourite notion – we read and became familiar with the theory, we critiqued our own practice in terms of the theory and tweaked our presentation. However, our reading of theory was having little affect on students' writing: they just did not seem to write with the same awareness of rhetorical and social issues as found in discourse and writing theory and research. My theoretical understanding of what it means to acquire the discourse of a particular field did not fit my experience as a practitioner, and I began - very cautiously - to wonder whether I was not looking too long at other peoples' theories and too little at the students' experiences.

Much discourse and writing theory is based on research with students in arts programmes, or in dedicated composition courses (Bizzel 1982, Bartholomae 1988, Cooper 1990, Chiseri-Strater 1991, Flower 1994, Geisler 1994, Ivanic 1998). The relatively little research based in engineering education suggests there are differences between engineering writing and other writing (Selzer 1983, Herrington 1985, Braine 1995). Some theory is not based exclusively on research in higher education (Knoblauch and Brannon 1983, Gee 1996). Much is based in foreign contexts, while research in higher education in South Africa (Angelil-Carter 1997, 1998, Thesen 1997, Boughey 1998, Amos 1999) is increasingly focusing on the challenges posed by the socio-political history of education in South Africa, so that it seems an uncritical importation of theories without due regard for socio-political context is unwise. My reading informed me, but did little to lessen my sense of inadequacy and inappropriateness. Despite my exploration of

theory, I was not sure that I understood what it means for students to experience 'becoming an engineer', and I became convinced of the need for a study of their experience.

This study is of six industrial engineering students' experience of acquiring the discourse of engineering. I also teach electrical and mechanical engineers, but have chosen to investigate industrial engineering students partly because to me, it is the 'human side' of engineering, concerned with issues more accessible to me than calculations and formulae, and partly because of the informal discussions I have had over the years with the lecturers whose offices used to be situated one floor beneath those of the language department.

The engineering programme comprises four semesters classroom learning and two semesters experiential learning in a local industry, in total three years leading to a national diploma. In the first semester all students do a communication course in which they learn the writing and presentation skills needed to practice engineering once they graduate. At this stage most students have just left school where – as they are quick to remind me – they 'hated' English. I soon learnt that when at the start of each semester I introduce the course, the first thing I need to tell them is that this course is nothing like what they had done in school English.

What I do not tell them is that the way the structure of the programme separates writing and language into a stand-alone course offered in the first semester and isolated from content subjects, is theoretically indefensible. It is quite unjustifiable in terms of anything but the timetable – their later academic semesters are too full to move the professional communication course to the end of the programme, or at least to <u>after</u> they have done some experiential learning. The national curriculum, while not stipulating that it must be offered in the first semester, does require that it is offered as a <u>separate</u> credit bearing subject, not as an integrated part of other subjects. And so at the start of their first semester when like me, they have done no engineering, they come to learn what they will need to do in three years time, once they finally go out to work, having learnt in the meantime to become engineers. Under these circumstances it would not be incorrect (if

a bit cynical) to include in the prospectus as the course description: C*ommunication in engineering for non-engineers by non-engineers.*

Despite the effort on my part to contextualise my course and to locate what we do in industrial engineering, I am aware of its *erzatz* quality and feel that students are too. All I can teach them in that first semester about writing is generic. I must hope that they will later be able to draw it into their engineering discourse. But my experience with them during that first semester makes me wonder how far this hope is in fact possible or likely, or whether it is not just a sop to my professional conscience.

At the same time that my concern about the course was developing a measure of disillusionment, another very public development was occurring in higher education which has also influenced me to undertake this study. That is the transformation of higher education, but specifically of our technikon.[1]

Since I started teaching at the Technikon, it has transformed from a designated white institution to a multiracial institution in which the white students are now the minority. Despite occasional demonstrations on campus, this transformation was accomplished smoothly, with little outward or observable indication of the revolutionary change it in fact was. While accounts of transformation at our institution are usually given in terms of student demographics (Port Elizabeth Technikon 1999) and are useful as a quantitative indicator, such accounts do not reflect the significant transformation in what it means to be a student. There is more to the transformation of higher education than counting heads by race group. As the student profile changed and more non-traditional students were enrolled, it became obvious that as individual lecturers and as an institution we need to

[1] Similar to the British polytechnics, technikons were part of a binary higher education system until 1997. The distinction between universities and technikons was then dropped so paving the way for technikons to style themselves as technical universities.

reconceptualise all aspects of teaching and learning, to look again at what it means to acquire the discourse of a particular field.

This personal and institutional background contextualises the study. I do not deny my subjectivity or my interest in the study, but develop and articulate it to provide a framework for access to readers. This articulation also "facilitates the struggle to hold in abeyance those interests and presuppositions that may detract from the aim of the description" (Petersen 1994: 181). I discuss methodology in chapter three, but here articulate my subjectivity also in terms of the method I have chosen.

Some forms of qualitative research would compromise my regard for the autonomy of the individual, as in my judgment, they presuppose or imply a researcher/ researched relationship in which the researched is deemed lesser than the researcher, or becomes the 'subject'. In phenomenological research the experience of the individual stands above both the researcher and theory. I am uncomfortable with action research which sets the researcher up as one who knows and who (most co-operatively, collaboratively and politely) will tell you what to do to improve your practice. I am uncomfortable with research in the critical theory tradition which too, implies that the researcher is the one who knows, and with whose critical and liberating insight, the scales blinding you to your oppression will fall from your eyes. My concern in both instances is highly personal and subjective, and no doubt easily refuted by researchers in these traditions.

I do not discount research in these traditions, but say merely that I am more comfortable with the role the researcher assumes in the phenomenological method. In the phenomenological method the researcher makes no claim other than to offer understanding. In contrast to the claims of action research or critical theory such a claim may seem rather meager. But, as phenomenological researcher I can promise only "that the phenomena studied will make better sense, that we will see how the experience 'works' or comes together as meaningful for these people" (Petersen 1994: 180).

Having declared my pre-conceptions and interests I can now proceed to a statement of the research question.

1.2 Statement of research question

The research question is quite simply and singularly:

> What does it mean to a student to acquire the discourse of engineering?

This study sets out to obtain a better understanding of under-graduate students' experiences of acquiring the discourse of engineering. The intention is not to measure in any way students' acquisition of engineering discourse. I offer this almost as a disclaimer, for it has been my experience while doing this study that the phenomenological quest for understanding is deemed not quite enough – it is some how expected that research must contribute to our lives in a more beneficial, tangible or measurable way.

And so there is possibly an implied secondary question in this study, one which grows from the study itself: to understand phenomenology as a method for educational research. But this is not a separate question, rather a by-product of the question itself, for in every study the method (whatever it is) is present as an instance.

1.3 Organization of the study

As is required at the start of a phenomenological study, this chapter has been devoted to a declaration of my pre-conceptions (Petersen 1994: 180).

Chapter two offers a survey of the literature covering theories of discourse, writing, language and learning.

Chapter three considers the phenomenological method used in this study.

Chapter four contains the situated descriptions of all six participants so that the essence of discourse acquisition as experienced by each student emerges. This chapter is based on the natural meaning units (NMUs) contained in the appendix. The NMUs are taken from the interview protocols.

Chapter five draws from the situated descriptions the themes or aspects of commonality among the students. It contains the general description or essence of the phenomenon which is developed from the themes.

Chapter six discusses the findings by juxtaposing the students' experiences with other research and established theories, so that the significance of their experiences emerges.

Chapter seven considers the implications of the students' experiences for understanding discourse, writing and learning.

Chapter eight is a review of the study in which recommendations are made and an assessment of the appropriateness of the phenomenological method for this study is considered. It concludes with suggestions for future research.

Chapter Two

The literature

The answers are not in the back of the book.
(Cooper 1990: 66)

This sentence, now the title of a chapter on developing discourse practices in first years, was originally the lament of an exasperated student. It appeals to me as an elegant and authentic expression of the complexity and frustration of the task students face in acquiring the discourse of a particular field. Discourse acquisition is not the kind of thing for which there is a single solution in the back of the book – or even a book, as will become apparent later in this chapter.

That by its very nature discourse is not as easy to teach as content is possibly what has made students' acquisition and/or learning of discourse such a neglected item on lecturers' agendas when developing curricula. While lecturers are quick to point out and lament students' language problems, they take it no further than surface level errors. Furthermore, such neglect of discourse is easily glossed over in circumstances where the students are drawn from mainly upper middle-class backgrounds, and are likely to bring the discourse with them: the discourse of higher education and of the student's chosen profession is 'implicit', it is part of what the student brings and thus not incorporated as an explicit part of the formal curriculum. This neglect of discourse across the curriculum, has typically resulted in the offering of a separate, compulsory writing course – usually referred to as a 'service' course - which students begrudgingly complete while content lecturers bemoan the lack of transfer of writing skills into their courses. The rationale for such a separate language course is usually along the lines of students needing to 'top –up' their English, so that they will be more fluent and thus cope better in other courses. Such reasoning does not acknowledge, or adequately acknowledge that political nature of language teaching. Pennycook, in arguing against a reduced sense of its political nature, urges that "we must see the political as involving all relationships within a society, as concerned with all the fundamental inequalities, particularly those basic to class race and gender differences" (1989: 590). Language is not neutral.

A separate language course approach also fails to acknowledge that "learning to mean and learning a language are separate, partly autonomous processes" (Gee 1990: 73). This scene is familiar in higher education for:

> the English department retains control of how writing is taught and valued elsewhere, not as a medium of intellectual discovery but as a system of technical constraints, introduced into classrooms chiefly so that an expert in grammar and rhetoric, or an ersatz expert, can evaluate its mishandling by student writers. (Knoblauch and Brannon 1988: 466)

That this has happened is not, as Pennycook (1989) points out a natural development, but the result of a the language teaching industry, which has itself had a part in constructing the discourse of education. Referring to method in second language teaching, he identifies two of the "serious implications" of language teaching that tend to be glossed over: the production of interested knowledge and the political nature of language teaching (1989: 589).

Not to acknowledge the political nature of language teaching implies also that it can be taught as a discrete skill. Much of the initial focus in academic development in South Africa was precisely on discrete language courses. Built around personal traits (for example motivation) or skills and strategies which facilitate language learning, such language courses imply a view of language as apolitical, and neutral in terms of knowledge. As Boughey argues (1998) the English for academic purposes (EAP) courses typical of academic development is in fact characteristically European /US mainstream. She goes on to argue that in the early days of academic development it was deemed too political (racist) to talk about students in terms of culture and cognition, so the euphemism "second language" learner was used to re-label such students – supposedly in an apolitical manner. (Boughey 1998: 170). Far from showing how apolitical language teaching is, it underscored just how political it is – and how uncomfortable academics and institutions were with the politics of language and education.

2.1 Discourse and higher education in South Africa

The role of discourse in students' learning became the focus in academic development in higher education during the 1990s in South Africa (Starfield 1990, Boughey 1998, Moore 1998, Moore, Paxton, Scott, Thesen 1998, Amos 1999) because of the sudden and significant change in student profile that occurred along with the political changes in the early nineties[2]. Only when there was great diversity in the discourses that students brought with them to higher education, did the issue of discourse, and how to 'teach' it become a concern to lecturers outside language and linguistic departments. It could no longer be glossed over or taken as implied.

And even then, in many departments the sense of great unease about how students are coping with discourse is often ignored or construed as mere 'language problems' (errors having to do with surface features of grammar), as lecturers try in vain to get through the content (Gee 1990:73). Boughey in debunking the myth of the language problem says that institutions need look at students' "understanding of the purpose and practice of writing, rather than (in) the simple lack of linguistic awareness" (1998: 171).

Although the interest in discourse has been a recent development in South Africa, it is certainly not new, or unique to South Africa. Moffett (1968) writing in the US argued strongly for a reconceptualisation of the traditional approach to curriculum which separates the content subjects and languages. He argues that there is essentially only one subject and "that subject is discourse itself" [3], so that all content subjects are in fact subclasses of the dominant discourse (in the case in schools) or, in the case of professional education, knowledge privileged to that particular discourse community (1968: 212). He believes that the subjects should be:

> viewed either as bodies of content (symbolized) or as ways of processing information (symbolizing). As content, they are what one discourses about; as process, they are acts of discoursing. Either way they are not subjects separate from …language, but specialized examples of the functioning of that language.

[2] Cf. Grabe and Kaplan (1985: 85) for an account of the factors that coalesced in the sixties in the US. Essentially the same changes occurred in South Africa in the nineties.
[3] In the context of Moffett's book, discourse refers specifically to English. Later in this chapter I will discuss the contemporary, wider understanding of discourse.

(Moffett 1968:212).

My experience as a language lecturer on the periphery of an engineering course leaves me with the impression that unfortunately, engineering curricula still tend to treat subjects merely as bodies of knowledge, and pay little head to how students process or know that knowledge. The content subjects are regarded as ends in themselves that exist totally separate from language. Students – and lecturers – in content classrooms seem not to realize that at the moment that content knowledge is cast in language, it becomes language also (Ball, Dice & Bartholomae 1990: 343). There seems to be little acknowledgement in their teaching, learning and assessment of the discourse/content unity: that the content constructs the discourse and the discourse constructs the content. Discourse is not an optional extra to content, and despite content teachers' reluctance to take responsibility for discourse by downplaying language, it is an essential part of content. Martin, addressing teachers who in an attempt to make science more accessible through activities (doing), and so downplay language, says quite plainly: "But diluting scientific discourse necessarily involves diluting the science that is taught. As we have seen, science is unthinkable without the technical language science has developed to construct its alternative world view" (1993: 202).

Moffett was one of the earliest advocates of the teaching of discourse and much has since happened. The growing awareness among teachers of the need to focus on discourse was due not to their universal reading of Moffett, but to the sheer pressure of necessity as student demographics began to change – something that happened in the US in the sixties and here almost thirty years later. Discourse is now a widely acknowledged factor in the teaching of undergraduate courses, and often the focus of literature dealing with the academic development of undergraduates (Bazerman 1981, Bizzel 1982, Herrington 1985, Bartholomae 1988, Spack 1988, Starfield 1990, Beach and Hynds 1990, Kotecha and Rutherford 1991, Lemke 1995, Leki 1997, Amos and Fischer 1998, Angelil-Carter 1998, Boughey 1998). If lecturers are still ignoring the role of discourse in the classroom, it is not for lack of current academic debate.

What concerns me in this study however, is not lecturers', but students' awareness of discourse in learning to become an engineer. In the 12 years that I have been teaching a

separate language course (Communication Skills I) to first year engineering students, I have seen very little awareness among students of the discourse of their discipline. They regard the language course as totally separate from the rest of their programme: a bit of a nuisance, and something to be completed with minimum interference in their 'real' courses. I must unfortunately agree with Kotecha and Rutherford's summing up of engineering students' attitudes in this regard: "To them, mastery of content is paramount" (1991: 101).

So, although theorists may advise otherwise, in practice there is still a marked tendency to emphasize content at the expense of discourse acquisition. Moore's recent research among science educators shows there are two distinct camps or approaches in terms of lecturers' understanding of writing in undergraduate courses: the instrumental approach and the 'communicative', or academic literacy approach (1998: 87). Followers of the instrumental approach regard language as a conduit for content, and are inclined to shun any responsibility for teaching undergraduates the discourse of their field. A quote from one of Moore's respondents, illustrates this approach (which I too, have often heard expressed by my colleagues) powerfully, if rather bluntly:

> *If they won't make the effort to brush up in the medium they are being taught in, there is nothing we can do, and they have to fail if they can't communicate.* (1998: 88).

This approach is never preached at conferences, nor is it written up as theory, but quietly perpetuates itself in many engineering (and other) classrooms. As a classroom practice however, it obviously filters through to students, and affects the what and how of their learning. Students are adept at figuring out what lecturers want, at 'cracking the code', and delivering accordingly.

Amidst the contemporary awareness of the importance of discourse in the learning of content (albeit as Moore shows, not among all academics), one may well ask what affect this is having on students – after all, they are doing the learning. In view of the mounting evidence from theorists that discourse is inseparable from students' learning, why does it seem to me as if students are content-obsessed, still unaware of discourse in

their learning to become engineers? Kapp hints at an answer in her observation that "in many cases academics are themselves so immersed in their disciplines as to be unaware of the specificity of the cognitive and linguistic demands they are making" (1998: 28).

Bizzel focuses on the students' lack of awareness when she proposes that undergraduate writers' problems are:

> better understood in terms of their unfamiliarity with the academic discourse community, combined, perhaps, with such limited experience outside their native discourse communities that *they are unaware that there is such a thing as a discourse community with conventions to be mastered*. What is underdeveloped is their knowledge both of the ways experience is constituted and interpreted in the academic discourse community and of the fact that all discourse communities constitute and interpret experience.
> (my emphasis 1982a: 230)

This is an alternative interpretation to the more common language problem diagnosis. There is far more involved than language (regarded separately from content). Taylor puts it succinctly: "much poor syntax arises because some students do not know, or only dimly know what they are talking about (1998: 58).

The issue Bizzel alludes to will be explored in my study: students' awareness of the academic and professional discourse in the curriculum and the role it plays in their learning. For despite my perception as a language lecturer that students are content-obsessed, oblivious of the function of discourse, when they graduate they must surely have acquired more than what they think of as content.

Professions such as law, medicine and engineering are well organized and ensure through a "seamless credentialing sequence" (Geisler 1994: 82) that those admitted or certified to practice have acquired more than just the content in the sense that the Kotecha and Rutherford (1991) refer to. The Engineering Council of South Africa (ECSA) as credentialing body is influential in curriculum matters because of its accreditation function. While it "does not prescribe how learning must take place" it does identify what "is expected" and refers to learning, teaching, outcomes and assessment (ECSA 1999: 4 - 8). From its accreditation guidelines for technikons (ECSA 1999) it is clear that by the

time students graduate they are expected to have acquired the discourse of engineering. In particular, reference is made to the compulsory experiential learning in the programme in which "the learner becomes familiar with the culture, work ethic obligations and behaviour expected in the real working environment" (ECSA 1999: 7). So although students may believe "mastery of *content* is paramount" (my emphasis Kotecha and Rutherford 1991: 101) the ECSA has a wider expectation which includes discourse.

Further evidence that the profession as a body requires more than content from graduates comes from a Foundation of Research and Development sponsored survey of employers' opinions of graduates and engineering education in South Africa. They recommended that institutions should take responsibility for improving graduates' "managerial skills" (this would include the soft skill "communication" which was rated lower in terms of graduates' competence than their "theoretical knowledge") (Van Vuuren and Pouris 1992: 549).[4]

In this chapter I will survey the current theories of discourse acquisition, writing and learning, with a brief mention of the function of language in discourse, writing and learning. Although they are discussed separately, they are inseparable in their functioning: in discussing one, the other two are always implicated. This exploration will be done against the background sketched above – one in which to me there is an incongruity between what I know from theory my students should be doing, and what I think from experience my students are doing. Ultimately, beyond this chapter, this study will be devoted not to testing or developing theory, nor to my reflections on classroom observation or examinations of texts, but to students' experiences of their acquisition of the discourse of engineering in their undergraduate course.

2.2 Discourse

Although now widely used in the context of writing and learning in higher education, discourse is a term first borrowed from linguists and philosophers. I will begin by examining Swales' (1990) characteristics of a discourse community, then go on to

[4] It is significant that a national survey of this nature which has curriculum implications separates 'communication' and 'technical expertise' without justification. Cf. Knoblauch and Brannon 1988.

considering the definitions proposed by Kress (1985) and Gee (1990), both of which go beyond that proposed by Moffett (1968), and have been influential in shaping the current debate on the acquisition and 'teaching'[5] of discourse in higher education. I make brief mention also of Bakhtin's notions of intertextuality and heteroglossia. Gee's theory will be dealt with in greater detail than the others as it is widely used outside the field of applied linguistics as well. Gee's theory is significant for its emphasis of the ideological nature and function of discourse. In common with other theories of discourse it proposes a "conceptual bridge between the social event and the social system" (Lemke 1995: 17).

Swales identifies six necessary and sufficient characteristics of a discourse community (1990: 25): A discourse community:

> has a broadly agreed set of common public goals (not just a shared object of study);
> has mechanisms of communication between members;
> uses its participatory mechanisms primarily to provide information and feedback;
> uses, and thus produces, one or more genres in communication and to further its aims;
> has acquired some specific terminology (jargons and acronyms that may be puzzling to outsiders);
> has a ' threshold level' of members with suitable credentials (it needs to maintain a balance between novice and expert members to sustain itself).

From Swales' characteristics of a discourse community, and from Kress and Gee's use of the construct discourse, it is clear that discourse refers to more than language usage - it includes beliefs, attitudes and values, and is thus essentially embedded in ideology and social practice. In Kress' usage (1985: 7)

> Discourses are systematically organized sets of statements which give expression to the meanings and values of an institution. Beyond that they define, describe and delimit what it is possible to say … with respect to the areas of concern to that institution, whether marginally or centrally. A discourse provides a set of possible statements about a given area and organizes and gives structure to the manner in which a particular topic, object, process is to be talked about.

[5] I used the term 'teaching' in inverted commas here as it does not properly or adequately describe how discourse acquisition should be facilitated by teachers in the classroom. In a later section 'teaching' is dealt with more adequately.

Discourse thus defines not only the ways of using language in speech and writing, but also the ways of knowing: "they define, describe and delimit what it is possible to say". As Martin says: "…science is unthinkable without the technical language science has developed to construct its alternative world view" (1993: 202). The discourse of a subject is intimately related to what and how it is learnt.

This is not to say that we cannot have thoughts without words, but that knowledge is dependent on language and experience. Bizzel puts it as follows: "we can *know* nothing but what we have words for, if knowledge is what language makes of experience" (1982a: 223).

It is important to note Kress' emphasis on systematic organization – not an arbitrary or open process - which generates the 'sets of statements' in which the meanings and values of the community or institution are expressed. This is not the development of an innate capacity, nor the kind of process individuals are going to develop on their own. Kress' reference to what it is possible to say, either marginally or centrally, implies of course, that certain ways of saying, writing or knowing things are not possible, not accepted within that community. So although an individual can know or say things as he or she wishes, these may not be acceptable in terms of the values of the institution. Not anything goes – and within a discourse community it is not the individual who decides what does.

Gee differentiates between discourse (lower case d), which he defines as connected stretches of language that make sense, and Discourse (upper case Discourse) which is essentially a social practice rather than a stretch of language (1996: 127). He defines Discourse to mean a "way of being in the world" – like an identity kit in which the words, acts, values, beliefs, attitudes, social identities, gestures and clothes of the individual are integrated (1990: 142).

A Discourse, then, is composed of ways of talking, listening, (often too, reading and writing), acting, interacting believing, valuing and using tools and objects, in particular settings at particular times, so as to display and recognizing a particular social identity. (1996:128).

Gee after defining literacy as mastery or fluent control of a secondary Discourse qualifies it immediately: "Therefore, literacy is always plural: *literacies*. (1996: 142). Because there are many secondary Discourses, there are many literacies. It makes no sense in Gee's terms to talk of being universally literate, as if literacy was a one-size-fits-all concept, and, having attained the state of being literate, one was always and everywhere literate. Literacy, because it is a social practice, is always contextualised.

The lay concept of literacy is often of a single universal skill to read and write – what is referred to as an "autonomous text" model of literacy (the implication is that a text too is autonomous – isolated from a particular social context). Such an autonomous text view places literacy in contrast to orality. Gee on the other hand includes orality in literacy saying, "If one wanted be rather pedantic and literalistic, then we could define literacy as *mastery of a secondary Discourse involving print* (which is almost all of them in a modern society)" (1996: 42). (In this study in engineering and higher education the reading and writing of texts would certainly be included, but not exclusively so.)

Scribner (1988) in proposing an alternative to the "autonomous text" view of literacy, points out that traditional or lay conceptions of literacy focus on the attributes of the individual, and then work from there to define literacy. She argues: "But the single most compelling fact about literacy is that it is a *social* achievement; individuals in societies without writing systems do not become literate" (1988: 72). Scribner (1988) also showed through her work with an isolated tribe in Liberia that the higher order thinking skills commonly associated with literacy, are in fact the result of western schooling and not of literacy itself. This is significant, as in higher education the association of higher order cognitive skills and literacy reaches its pinnacle. In higher education a certain type of written literacy is highly valued – but that is because it is the social practice in higher education, and not because such type of writing is necessarily of a higher order cognitively. Scribner proposes as a metaphor for this type of literacy 'a state of grace' (1988: 76).

Gee's *Social Linguistics and Literacies: Ideology in Discourses* offers a "critical perspective on literacy and education" (1996). Gee approaches the issue as a linguist and his theory is based on research involving analysis of texts that range from pre-school children's talk with teachers to group discussions of students in higher education. His data is thus the actual use of language.

Gee's meaning of Discourse is essentially a way of displaying membership of particular groups, and thus also personal identity. This is so he argues, because in using language the speaker, in addition to expressing a message, needs to accomplish two things: to establish who he or she is, and to make clear what he or she is doing (1996: 124). In other words, successful communication involves more that using language in the 'right' way: it depends also on the speaker being the 'right' who, and doing the 'right' thing. We make clear to ourselves and others who we are, and what we are doing, we signal our membership of a particular discourse or group. This identification or 'rendition' of ourselves as being a member of a group occurs not only in language, but through thinking, acting, valuing and interacting (1996: 129). Our thinking, acting, valuing and interacting determines our ways of using language, and our ways of using language determine ways of thinking, acting, valuing and interacting.

Lemke in discussing Gee's distinction between discourse ("what we are actually saying (and doing)"), and Discourse ("social habits of different people saying (and doing) the same sorts of things in the same ways time and again") points to the notion of "socio-mental" which Gee uses as a "conceptual bridge" to link Discourses (social and cultural) discourses (mental) (1995: 16). Gee argues that Discourses shape discourses. Lemke also points to the cultural anthropological base of Gee's view of Discourse: he "sees discourses as characteristics of cultures and sub-cultures, of communities rather than individuals" (1995: 16).

2.2.1 Discourse, literacy and learning

Bakhtin's interest in discourse lies in literary criticism and philosophy of language. He is interested in the social origin and character of language, and regards language as more

than the mere product of an individual autonomous mind. Bakhtin proposes that "(t) he actual reality of language/speech is …the social event of verbal interaction implemented in an utterance or utterances" (Bakhtin in Lemke 1995: 22). For Bakhtin context takes precedence over text. He argues that any particular text is understood against the background of other similar texts, it becomes important to know "w*hich* other texts a particular community considers relevant for the interpretation of any given text" (Lemke 1995: 23). The construction of meaning of a particular text is thus always forged in the presence of other voices, hence his notion of heteroglossia in terms of which meaning is always multi-voiced.

He proposes that these distinct social voices are stratified into a variety of social dialects and languages of special groups – including those of the professions, and that: "All the languages of heteroglossia …are specific points of view on the world, forms of conceptualising the world in words, specific worldviews, each characterized by its own objects, meanings and values" (Bakhtin in Lemke 1995: 24). His inclusion of values, meaning and objects in the worldview make it possible to understand Bakhtin as a forerunner to Gee's later (and non-literary) theory of Discourse. Where Bakhtin differs from Gee is in his proposal of the principle of intertextuality and the notion of heteroglossia as the "conceptual bridge" between the social system and the individual event (Lemke 1995: 15).

Literacy is defined by Gee as mastery of, or fluent control of, a secondary Discourse (1996: 143). This leads to the distinction between "insiders" - those who are literate by virtue of their full control of the Discourse and their member status - and "outsiders" – those who are still learning, that is apprentices, or those who have failed to master the Discourse fully and who participate as "outsiders" or as someone "colonized" by the Discourse. Before they are true members, or insiders, they use the language by artfully copying the insiders. Gee expands on this position: when individuals without mastery need to participate in a Discourse, they can use their partial acquisition, plus learnt meta-knowledge to make-do or "mushfake". This is a coping strategy which allows individuals from a non-dominant Discourse to evade the gate-keeping function of a

dominant Discourse, and when necessary, to gain access to a group where they would otherwise have been obvious "outsiders" (Gee 1990: 147).

Although Gee talks about Discourses as 'social practices' performed by certain 'kinds' of people, he acknowledges that Discourses are always located in and experienced by an individual body and mind (1990: 137). Gee's notion of socio-mental is what links the social system (Discourse) to the individual event (discourse). As Lemke points out in Gee's theory the production of discourse "is still mental" (1995: 16).

Gee differentiates between a primary Discourse, which is acquired first, as a young child in the home environment, and secondary Discourses – any other Discourse learnt later in a less natural setting. An individual may master numerous secondary Discourses, which could result in tension between Discourses, particularly with the primary Discourse. Furthermore, he points out also that we are all members not of one, but numerous Discourses, and that we are different kinds of people in different kinds of Discourses. We adapt our ways of using language, other symbolic expressions or artefacts, of thinking, feeling, believing, valuing and acting as we move from one Discourse to another. We are thus able to identify ourselves as a member of a socially meaningful group or 'social network', or to signal that we are playing a socially meaningful 'role'.

Gee distinguishes between acquisition and learning of Discourses (1996: 138) as follows:

> *Acquisition* is a process of acquiring something (usually subconsciously) by exposure to models, a process of trial and error, and practice within social groups, without formal teaching. It happens in natural settings which are meaningful and functional in the sense that the acquirers know that they need to acquire the thing they are exposed to in order to function and they in fact want to so function.

Learning is a process that involves conscious knowledge gained through teaching (though not officially from someone designated a teacher) or through certain life experiences that trigger conscious reflection. This teaching and reflection involves explanation and analysis, that is, breaking down the thing to be learned into its analytic parts. It inherently involves attaining, along with the matter being taught, some degree of meta-knowledge about the matter.

In both these processes there is reference to an awareness of the process on the student's part; either as "knowing that they need to acquire" in the case of acquisition, or as "conscious reflection" in the case of learning.

Not only are acquisition and learning distinct processes (Gee does acknowledge that his distinction is not "airtight and unproblematic" (1996: 138)), but they have different goals or outcomes: acquisition leads to performing the Discourse, and learning to knowing the Discourse (1996: 139). If the goal is performance then learning will not suffice. The distinction also has implications for the role of the teacher: acquisition is fostered through apprenticeship, learning through teaching. Learning and the teaching that supports it, may lead to knowledge about, or meta-cognitive awareness, but it will be hollow, and not of much use without the performance that comes from apprenticeship. Learning, which results a meta-cognitive awareness, is necessary to critique (and change) a Discourse (Gee 1996: 145). It is acquisition though, and not learning that leads to mastery of a Discourse (Gee 1996: 139), and it is the mastery of a secondary Discourse that is required for literacy in a particular social context.

While language usage is undeniably part of discourse as a social practice, discourse is more than language usage, or 'conventions'. Cooper (1990) makes a clear distinction between discourse conventions and discourse practices. She argues that conventions, although agreed upon and explained by verbally explicit rules, are arbitrary and not rationally motivated. Discourse practices on the other hand, are not codifications or dependent on rules, but forms of social behaviour, and therefore habitual. They are motivated by purposes and values (based on Grice's principles of co-operation) and explained by reference to what people do (in a Wittgensteinian sense) (Cooper 1990: 68). She draws on Wittgenstein's notion of 'language-games' (transactions) which develop not around thoughts, but actions. Her distinction between discourse conventions and discourse practices is thus grounded on Wittgenstein's view of language as not just a unitary system, but a way of behaving (Cooper 1990: 74). Conventions thus "encode what people know about what is best to do or proper to do in situations"; practices "are what people do in response to the demands of social interaction"(1990: 73).

Like Cooper, Beach and Hynd conceive of discourse as "constituted by social strategies and discourse practices" (1990: 4), and emphasize that acquiring discourse is "not just a process of socialization or 'accommodation' involving the imitation of others, but a conscious awareness of options" (1990: 9). This involves the individual developing awareness of, and integrating what they identify as the four basic stances underlying discourse practices: social, textual, institutional and field.

2.2.2 "Les mots et les choses": a glance at Foucault

Foucault, although not a writing theorist or pedagogue, is included here because his theories on discourse and discipline have been influential in the formation of others' theories and pedagogies of writing. Along with other discourse theorists, he too provides an account of what happens between the social system and the individual event.

As a historian, he was concerned with developing a general theory of intertextuality appropriate to history. He proposes the notion of the discursive formation as a bridge between the social system and the individual text. He argues that a particular statement is never neutral or independent, but belongs to a series or network of other statements (1969: 99). Clearly for Foucault the "focus is on social practices, habits of activity characteristic of a community, not on individual aspects of intentionality" (Lemke 1995: 31).

The relevance of his work to this study lies in the implications of his theory to higher education – where an individual needs to gain access to an academic and disciplinary community. His definition of an academic discipline focuses on the fundamentally artificial nature of the divisions (familiar and 'natural' as they may seem to initiated 'insiders').

> Disciplines are defined by groups of objects, methods, their corpus of propositions considered to be true, the interplay of rules and definitions, of techniques and tools: all constitute a sort of anonymous

> system, freely available to whoever wishes, or whoever is able to make use of them.
>
> (Foucault in Ball, Dice and Bartholomae 1990: 342)

As Ball, Dice and Bartholomae point out (1990: 343) it is that "crucial qualification" - "whoever is able to make use of them"- that describes the position of a student who may well wish to make use of that anonymous system, but is either unaware that it exists, or only partially familiar with it. This is a possibility that Bizzel (1982a) also teases out.

As student populations changed, it became apparent, that this anonymous system – the discourse – was in fact not freely available to students, but that it was incumbent on those inside the system, to initiate the newcomers so that they would be able to make use of it. Many of the pedagogies that have since become standard practice in higher education composition courses, were developed with this responsibility in mind (Odell 1980; Bartholomae 1988; Berkenkotter, Huckin and Ackerman 1991; Bruffee 1984; Boughey 1997; Gee 1990; Herrington 1985; Ball, Dice and Bartholomae 1990).

Foucault's influence was powerful for he raised the issue of access – of the system not being quite "freely available to whoever wishes". As has been subsequently pointed out (Bizzel 1982b: 194-196; Gee 1996: 139; Moore 1998: 86), the irony is that the only people to whom it may possibly be freely available are middle-class students whose home discourse is close to that of higher education. The further removed the students' home discourses are from academic or professional discourses, the less able they are to make use of it, and it becomes instead, the invisible gate-keeper[6].

Having looked at the literature on discourse and how it is acquired or learned, it should be clear why Cooper's student said 'the answers are not at the back of the book'. (1990:66). In *Academic literacy and the nature of expertise* Geisler makes precisely the

[6] Gate-keeping in higher education whether it be in terms of gender, class, race, money or 'ability' has always been around. In South Africa the trend currently is for a 'language' based assessment, but one needs to note the work of Bernstein (1964, 1972). Bernstein differentiates between the 'elaborated code' typical of middle-class language using habits (and schooling), and the 'restricted code' of the working-class, but he does not in fact, imply that the use of a restricted code is the result of a cognitive deficiency. Bizzel refers to the often made equation of restricted code with restricted cognitive ability as a "vulgar error" (1982a). Bartholomae (1988) also makes the point in his evaluation of student placement essays: equating sentence level errors with poor writing is erroneous.

same point: that professionals or experts "are asked to deal with situations that do not have answers in the back of the book" (1994:61). The professional has to deal with ill-defined problems, not just apply techniques in a formulaic manner. Geisler goes on to argue that as long as students have an "autonomous text" view of literacy, they will look for an answer in the back of the book (1994: 93).

Discourse is about more than language: it is about a social practice shared by a discourse community into which the newcomer must be initiated through formal learning and apprentice-like acquisition.[7] In the case of an academic (and professional) community, writing is a dominant manifestation of its discourse. And so, it is first to writing and then language that I now turn, for as Bazerman points out, academic knowledge is "cast primarily in written language" (1981: 361).

2.3 Writing

References to discourse abound (as explicit or implied statements) in contemporary theories and pedagogies of writing. I will refer briefly to a few influential theories showing first, how learning to write involves more than language usage or convention, but functions also as a significant way in which the individual identifies him or herself as belonging to a discourse community; and second, that a particular discourse also has definite epistemological implications that become evident in the teaching of that discourse. The content and the learning of that content are constructed by the discourse – and the discourse in turn is constructed by the content and the learning (knowing).

I will not review theories of second language (L2) writing (Kroll 1990, Leki 1992, Raimes 1991, Zamel 1987) separately as this study is not primarily concerned with discourse acquisition of L2 students[8], but I acknowledge that to a large extent L2 theories are outgrowths of the process theories. Having said that, I must add my

[7] This understanding of discourse implies significant political and moral questions– should we initiate an individual from another discourse, when in terms of discourse theory it is quite possible that such initiation may alienate her from her primary discourse, from herself? (Cooper in Grabe and Kaplan 1996: 109)

[8] It is not by design that four of the six participants are L2, but merely a reflection of demographics in SA higher education at the moment. First or second language was not considered in selecting participants.

acknowledgement of both the similarities and significant differences between learning to write in a first language (L1) and an L2, and the unique complications that accompany learning to write in an L2 (Sinclair Bell 1995, Grebe and Kaplan 1996).

My review begins with the literature that followed the demise of the product approach, but I first look briefly at the recent history of student writing. During the eighteenth century. rhetoric became an important aspect of university education, and by the late nineteenth century Harvard had introduced its first freshman composition course (Grabe and Kaplan 1996: 11). There was rapid growth in such courses in the US (but not elsewhere) and the "current traditional" approach to writing which emphasized "handbooks, the use of model texts, and theme writing in the various modes of discourse" was established (Grabe and Kaplan 1996: 11). This exemplary model approach in which the focus was on the product the student was to deliver served as the principle around which writing courses were structured for almost a century. What mattered was that the student could deliver a similar text, and form rather than meaning was emphasized. What the student did in writing the text (writing as process) or what function the text served (writing as social action) was not considered until this product approach became discredited in the seventies.

In *Composing process: An overview*, Bizzel (1986a), identifies two broad schools of thought since then in writing pedagogies: process pedagogies (derived from cognitivist theories) and the social contextual pedagogies – what I refer to as initiation pedagogies - (based on social constructivist theories). In presenting her own pedagogy, Bizzel differentiates in terms of "inner-directed" approaches that focus on language and thought prior to social influence, and "outer-directed" approaches that focus on the social processes that shape language and thought in learning (1982a: 215). Beach and Hynd (1990) make a similar distinction in their review – they refer to cognitivist, expressionist and social contextual theories. Rose (1985: 232) refers to a "trinity" of cognitive, affective and social considerations that form the focus of writing theories. He groups cognitive and affective together as they are both concerned with the "domain of human mental reality". Grabe and Kaplan (1996) identify four stages as writing theories developed: expressive, cognitive, social and discourse community stages. The first two

would be covered by Bizzel's 'cognitive' category, the latter two by her 'social contextual' category.

As these classifications are variations of the same theme, I will follow Bizzel's binary distinction for the sake of simplicity, although certain theories that I review, (for instance Flower 1994) may blur the boundaries of this distinction. The theories included in this chapter were chosen because of their dominance in the field. In a chapter of this length I could not cover all possible theories without reducing my review of them significantly, in which case it would be a list rather than a review. I differentiate and characterize theories reviewed in this section in the spirit of Candlin's observation that labeling various approaches "may be less descriptions of academic or educational value than they are manipulated slogans for the credulous, yet they do signify importantly distinguishable positions, if as I say, often exploited" (Candlin in Grabe and Kaplan 1996: xiv).

Characteristic of cognitivist theory and process pedagogies is the belief that writing is essentially an individual act in which the writer develops from a basic to an experienced writer by following distinct strategies which form part of 'the process'. The process typically followed by experienced writers (in higher education) contains strategies for planning, writing and revising. The process privileged in academic writing is privileged through convention established over generations. It not a natural or universal process, but itself a social process or social act. Looking at what writers do, was a step away from the preceding century's focus on the product, but it did not acknowledge that the writing process is ultimately part of another social process.

Characteristic of the social constructivist theory and initiation pedagogies is the belief that writing is essentially a social act, in which the writer needs to construct meaning in a manner conventional in that particular community. Both schools of thought ascribe to the learner writer a high level of awareness of its central tenant (be it cognitive strategies in the writing process, or writing as a social practice). They describe the experience of writing in terms of awareness – either of the cognitive process/problem solving, or of social action. It is these claims of a high level of awareness on the part of the writer (and

the underlying view of writing and discourse) that have prompted me to undertake a phenomenological study of the students' experience of learning to write as engineers.

Under the influence of pioneers like Emig (1971, 1977) and Britton (1975) working in environments where the student demographics had changed from a decade previously, the focus of writing courses gradually shifted from the then prevailing product focus and grammar-and-style approach, to the activity of the individual writer. Emig (1977) working in the US, made explicit what is a fundamental underpinning of current approaches: writing is a "unique mode of learning", what Bartholomae (1986: 2) refers to as knowing things differently after having written about them. Britton, working independently in the UK, but essentially committed to the same view, took writing outside the language classroom and advocated 'writing across the curriculum'. Emig's work triggered great interest in "what goes on in the individual writer's head" (Bizzel 1986b: 56), and was the impetus for further research that led ultimately to the process pedagogy. The shift marked by the theories of Emig and Britton led first to the personal-style pedagogy (Elbow 1973, MacCrorie 1980, Graves 1983, Murray 1986), and then to the cognitivist and process pedagogies (Shaughnessy 1977, Flower 1979, 1988, 1994, Flower and Hayes 1981, Berreiter and Scardemalia 1985,1989, Applebee 1986, Leki 1992). The social constructivists theories and initiation pedagogies (Bizzel 1978, 1982a, Faigley 1986, Becher 1987, Bartholomae 1988, Bazerman 1985, 1988) developed in response to the perceived neglect of social factors in personal-style and process theories.

My review of the literature in the cognitivist and social constructivist schools is preceded by a brief account of the personal-style pedagogy of Elbow. Although a process theory in the broad sense, it warrants separate treatment as it has unique features and a totally different 'appeal'.

2.3.1 Writing: "into the blue"

Elbow's pedagogy first appeared nearly thirty years ago and was one of the early alternatives to "product" approaches, and he thus paved the way for the development of

the process writing theories. Although Elbow's *Writing Without Teachers* (1973) proposed a pedagogy of personal style in which the authentic voice of the writer rather than the discourse of the community was to emerge, his stance on discourse acquisition was quite clear: he "simply rejected the academic community's discourse expectations" (Bizzel 1982b: 193). In personal style writing the teacher does not have an authoritative or directing role, but collaborates with the student in finding his or her own voice. The teacher's role is to empower the student to resist the oppressive or silencing power of academic discourse, and not to guide or initiate the student in mastering or appropriating that discourse. Writing is about finding individual voice, and not about mastering the practices of the community in which one writes. Although his pedagogy of student voice which exalted individual expression over institutional convention is far removed from social constructivist theories which regard writing as a social rather than an individual activity, it did however, contribute to the discourse debate as it highlighted the political and cultural nature of learning to write.

Despite the dominance of the cognitivist and social constructivist schools of writing over the past decade, Elbow published a second edition of *Writing with Power* (1998) in which he affirms his belief in the romantic or mysterious dimension of writing. In his introduction he refers to "felt sense" (1998: xvi), a term which he says he borrows from phenomenology and uses as a guide in writing, saying almost flippantly: "Just write off into the blue and see where you get, the hell with planning" (1998: xxii). His pedagogy of 'just-write-and-see-where-you-get', although having certain points in common with process writing theory, differs in significant ways from what he regards as the other more rational or rigid pedagogies discussed in this chapter. It makes for a stark contrast with Ball, Dice and Bartholomae who, in their critique of own voice pedagogies, point out that in academic contexts "textual activities are complex and artificial – not to be assumed by teachers" (1990: 352). They would not be arrived at by students "just writing off into the blue".

There is no reference to discourse in either the index or contents of his book (although there is a chapter on "Writing and Magic"). And yet, my observation of students writing allows me to believe Elbow when he claims that since its first publication twenty years

ago, his approach has helped a number of students writing in academic contexts (1998: xxvi). Despite Elbow's concern with the 'mysterious' rather than with the rational discovery of strategy and process, or explicit discourse acquisition through social negotiation, his pedagogy is worthy of inclusion in a review of the literature in a phenomenological study such as this. There may be something 'mysterious' about how a student learns to write that doesn't quite fit the explanations offered by the neater, rational theories.

2.3.2 Writing: "inside the head"

Advocates of the cognitive approach regard writing essentially as a cognitive task and describe it in terms of problem solving. The extent to which issues of social context feature in this problem solving varies, but it would be unfair to say that cognitive theorists overlook or deny the influence of social-contextual factors in the writing process. When it was first advocated, "process not product" was a slogan that gave writing teachers great hope, but as Horowitz (1986: 141) points out in his review of the process approach, process was the "buzzword" of the eighties, and was to be "miscast as a complete theory of writing". The process approach was grasped at with such fervour by writing teachers (who had just escaped the dictates of the product approach) that Bizzel was to charge Flower and Hayes with creating a "Procrustean bed" (1986: 57) in the field of writing pedagogy. By the mid-nineties Flower, a leading cognitive theorist, was giving social context considerable significance in her pedagogy, *The Construction of Negotiated meaning. A social cognitive theory of writing* (1994).

Although theories in the process tradition differ significantly from the product approach it countered, it should be noted that "No matter what sort of writing we are doing, our ideas – as *embodied in a written product* – are always available for criticism and revision (my emphasis Odell 1980:43). It may be stating the obvious, but it is always the embodied written product and not the writer or the process the writer performs, that is evaluated. The implication of this focus on the embodied written product is as Raimes writing in L2 contexts argues: "Most assessments of skill in writing look at the written products and thus inevitably take language proficiency into account" (1985: 232).

What is somewhat overlooked by researchers in the process approach is that they were privileging a particular socio-cultural practice (that of higher education) and its attendant cognitive practices. These were held to be the norm, rather than a particular type, and teachers who were part of the practice started to teach these practices as skills to students. This led to the situation where students started being 'problematised' because educational institutions value 'school literacy' it becomes the defining literacy, but also one which marginalizes other kinds of literacy (Boughey 1998: 168). For as Grabe and Kaplan point out, "most students who display writing problems in educational contexts do, in fact, have writing skills; they are just not the writing skills educational institutions value" (1996: 7).

Following as it did on the product approach, the process approach is understandably appealing but it has tended to foster a belief that writing is about learning certain key skills – detached from the rest of the academic or professional practice in which it occurs. Boughey questions the origins of the notion of skills saying "weren't those 'skills' actually just the practices of a group of people who shared a common understanding of writing as a process of making meaning for a reader and saw that process as central to roles they wanted to play?" (1996: 3). A process approach is likely to lead to the teaching of discrete skills because it does not place sufficient emphasis on writing as a social action within a discourse, but tends rather to focus on what the individual must do.

Because process theories of writing are possibly most clearly and comprehensively exemplified by Flower, her pedagogy (particularly her 1994 work in which there is a significant shift towards social considerations) will dominate this section. (Her earlier publications (Flower 1979, Flower and Hayes 1980, 1981) in which cognition and/or process arguably featured more prominently will not be covered here. See Grabe and Kaplan (1996) for a discussion of the shift towards social aspects.) I will also review the work of Odell (1980), Bereiter and Scardemalia (1985, 1987), and finally Shaughnessey (1977).

In her early work **Flower** equates writing with problem solving, identifying six steps in analysing a problem (1981: 21-26). Strategies useful for solving these problems were sought and grouped around planning, writing and revising. In a number of publications with Hayes (Flower and Hayes 1977, 1980, 1981) she developed a cognitive model of the writing process in which they assert the three basic premises of the process theorists: that writing (composing) processes are interactive and recursive, that writing is goal directed, and that expert and novice writers compose differently (Grabe and Kaplan 1996: 91). The model they devised divides the process into three components: the composing processes, the task environment and the writer's long-term memory (Hayes and Flower 1983:208). The composing processes consist of planning, translating and reviewing, and these are controlled by a 'monitor'. The planning process is further sub-divided into generating ideas, organizing information and setting goals. A brief account such as this makes it all rather simplistic, and Flower, aware of this perception was later to caution against the "myth of the 'good process'", pointing out that it was not about training students to go through the strategies like circus dogs through hoops (Flower 1990: 242). Students must be aware of how the strategies function in writing and not work through them in check-list fashion

Strategic awareness, Flower argues, is necessary to help students adapt and extend the processes they already use, and so extend their repertoire of cognitive processes to better support them in higher education. . She however, acknowledges the "disquieting possibility" that students' awareness may be hampered by social and cognitive forces - the schools and the students in them (1990: 233). Students making the transition into higher education rely quite naturally on the school-learnt writing strategies that previously worked for them. If they do not develop an awareness of the differences between school tasks and the more complex constructive acts of writing in higher education they may make a "*tacit transition"*, never appreciating the significant changes in rhetorical context or task. In fact, "(t) hey may simply fail to see what all the fuss is about" (1990: 233). This seems to mean that it is possible for students to progress through higher education demonstrating their mastery of the process and skills, but without acquiring the discourse. There is more to discourse that the execution of process. Where Gee (1996) would argue that discourse acquisition is about taking up a new

stance, a process approach seems to suggest that it is possible to avoid taking up a new stance while nonetheless executing the process.

Flower's social cognitive theory of writing (1994) foregrounds the active role of the individual in constructing meaning. The constructive act in which the individual engages involves more than being socialized into a discourse community, beyond appropriating existing conventions. Although the individual constructs meaning within a social setting, the construction itself is not a social process. The process of meaning making is "an event that occurs in *the minds of individual thinkers/writers whose cognition is embedded in and shaped by the social contexts and emotional realities*" (original italics 1994: 89). It offers a cognitive perspective on the socially embedded constructive process focusing on the interpretive acts of the individual, on the "*the transformations of knowledge and the internalized social negotiations by which individual writers construct personal meaning"* (original italics 1994: 89). These internalized social negotiations are characterized by conflict and tension not typical of an ordinary process of socialization; they result from the high level of awareness ascribed to the writer. The cognitive process in which the individual resolves the tension, requires strategic action and internal negotiation between the conventions of the discourse practice in which the individual operates, and the goal directed choices (intentionality) of the individual.

Despite the constant references to "social" in her theory, Flower styles herself a "cognitive rhetorian" who is "not persuaded by the polemical, dichotomizing stance of much social theorizing" (1994: 203). She goes on to position herself in terms of the social constructivists rather sharply as follows (1994: 203):

> …I am not persuaded that reified social forces and discourses (rather than mutually influenced thinking people) exist as independent constructors of meaning in any place other than in the minds of consenting theorists (who are engaged in interpreting and responding to one another).
>
> I would argue that research with individual writers gives us a vigorous picture of students as agents whose goals and awareness make a difference.

It is the reification of the social that she opposes, not the social *per se*, and she incorporates social context in her pedagogy from the angle of "the individual minds" that "construe the context" (1994: 204). She focuses on the interaction between cognition and context, pointing out that it is individual minds that interpret, negotiate, reinterpret and even resist social constructs.

Drawing on the work of Rogoff, she introduces the notion of "cognitive apprenticeship" which is solidly based in intersubjectivity and reciprocity (1994: 119). A cognitive apprenticeship is just that: "the focus of the learning-through-guided-experience (is) on cognitive and meta-cognitive, rather than on physical skills and processes" (Rogoff in Flower 1994: 119). The task of the teacher is threefold: to "*model* expert performance" (in the case of a cognitive process such as planning this would require that the teacher actually does the planning while talking out aloud), to "*coach*, working directly with the learner's own performance", and finally to " *offer a scaffold* for the learner's performance …and then to *fade* out of the performance" (1994: 119). Her notion of what the student gains from learning thus differs from Gee who emphasizes the role of meta-awareness or critical awareness that results from learning. He argues that such awareness is necessary to critique and change Discourses (1996: 145).

Because Flower conceives of meaning making not as a socially determined process, but rather as a socially situated cognitive process involving internal contestation, she introduces the concept of literate acts. These are socially situated problem solving processes in which the individual, driven by personal goals and purposes, reconciles the personal with the social (1994: 18). Literate acts occur amid tension and conflict. They go beyond literacy practices (which are shared by discourse communities and foreground the social construction of meaning), to cognitive processes in which the focus is on the individual acting in that community.

Literate acts, while they are embedded in literate practices, are thus always highly personal strategic acts in which the individual grapples with complex and contradictory goals and intentions to construct meaning. Literate acts are "sites of construction, tension, divergence, and conflict" (1994: 19) which occur at the "intersection" of

convention and individual goals. The individual involved in reconciling the dictates of existing practices and conventions with individual needs and goals, is engaged in the negotiation of meaning.

Flower emphasizes the role of the individual as agent in the process of making meaning through a rhetorical, social and cognitive process. She uses the concept "strategic knowledge" referring to the individual's goals, strategies and awareness. The introduction of this concept allows her to attend to three aspects in her pedagogy: "process", the "result of social shaping" and the "origin of personal agency"(1994: 205). The construction of meaning results not from a process of socialization into discourse practice, but is always the result of an individual's being aware of, attending to and attempting to resolve perceived discord or conflict that arises from the possible options or alternatives available to an individual in a particular situation**.**

The very term 'social cognitive' seems at first to suggest a concoction of two polarities. She acknowledges that there are "problems in even making these distinctions" (social and cognitive), but argues that these categories are used as "tools of inquiry" for uncovering the complex interaction of a literate act (1994: 30). Cole points out that while first generation researchers had made a distinction between individual and social (by assuming that what they were observing was the context free property of an individual), second generation researchers gave prominence to socially oriented problem solving, in which the "unit of analysis is the social interaction rather than the individual's behaviour" (1993: 405). Clearly Flower is second generation.

Flower's social cognitive theory of writing is based on data obtained through observation of students in collaborative planning sessions. She acknowledges that such collaborative planning in which the planner (writer) engages with a student supporter, although naturalistic, may differ from "solo" planning which all occurs internally and is thus not observable (1994: 131). Flower points out that where expert/novice comparisons are useful for looking at differences in writing, she is concerned with writers in the process of learning to write. Her observation is thus of writing as an educational process, "not just a writing performance in which producing text is the only objective" (1994: 173). Texts

she argues may be "very uncertain guides to a student's ability" (1994: 174) and she thus shuns texts (as well as retrospective accounts of the planning process) as a source of data.

Flower's theory attempts to put perspective on both social and cognitive aspects of writing: she tempers the power of the social - it is constitutive but not constructive - and acknowledges the limitations on the individual. A cryptic sentence from Flower pretty well sums up her theory: "But context is not an unmoved mover, and bounded intentionality is still intentionality" (1994: 204).

Bereiter and Scardemalia's (1885a) theory hinges, as does the work of Flower and Hayes, on a distinction between expert and novice writers. Bereiter and Scardemalia differ in an important way from Flower and Hayes: they propose that experienced and novice (less-experienced) writers do not use the same process for writing. What an experienced writer does is not the same as what a novice does but only better, it is qualitatively different. They consequently propose two models to illustrate this qualitative difference in the writing processes: the knowledge-telling mode (used by novice, or poor writers) and the knowledge-transforming mode (used by experienced writers).

Knowledge-telling is a streamlined set of procedures that allows the writer to bypass the complex problem solving strategies the experienced writer engages in (notably the consideration of goals), and still deliver, what in many cases passes for an adequate text or solution. The writer in this case sees the problem basically as one of generating sufficient useable information, and the 'goal' as telling all he or she has located or retrieved. Knowledge-telling is no less an educational discourse than is knowledge-transforming: if knowledge-telling is what is socially sanctioned and valued in a particular educational institution, then knowledge-telling is appropriate in that context. Giddens talks about the "*double involvement* of individuals and institutions: we create society at the same time as we are created by it" (Giddens in Boughey 1998: 166).

Grabe and Kaplan say of knowledge-telling that it "provides adequate support for less skilled writers to generate sufficient on-topic material while keeping cognitive complexity at a manageable level" (1996: 124). This account of the knowledge-telling

approach may sound euphemistic, but the fact remains that even in higher education, many students cope by generating on-topic material, avoiding any real grappling with the complexities demanded by many writing tasks. Teachers who accept 'tell-what-you-know' strategies – even when not called for by the task – promote "inert knowledge" and so actually impede learning, for knowledge-telling as a strategy will influence how students manipulate and even encode propositional knowledge. The kind of learning to result from this writing is reproductive. Knowledge-telling does have a role even in the writing strategies of skilled writers in a western academic context – it becomes a problem only when students believe that it is all there is to writing, while lecturers expect that students engage also in knowledge-transformation. Students who adopt a knowledge-telling approach to writing in higher education do so probably because it was endorsed during their twelve years at school, and possibly "Because it goes on working, they go on using it; that's what one expects of an adaptive organism" (Bereiter and Scardemalia 1985a: 79).

Knowledge-transforming includes knowledge-telling as one (the final) component in a complex problem solving process. The problem calls for a combined effort in terms of simultaneously dealing with content problems and rhetorical problems – the solution of one may "translate" into, or raise, further problems in the other (Grabe and Kaplan 1996: 124). Only when both content and rhetorical problems are adequately resolved in terms of the task requirements, can the writer proceed to the final stage of 'knowledge-telling'.

In the western tradition it is the responsibility of the teacher to set writing tasks that require students to grapple with appropriate content and rhetorical problems – not to allow student writers to get away with knowledge-telling. While knowledge-telling may well be valued or accepted in certain institutions or at a certain level of education, industry (future employers) has little use for writing as knowledge-telling. Students must get practice in tasks requiring the dialectical process of knowledge-transformation to fully 'know' the topic, [9] and to increase their employability. Such an approach clearly

[9] Leki (1997) argues fundamentally the same point in a L2 context. She refers to "text responsible" writing in which the L2 writer does not generate own (personal) content but is required to use source texts responsibly "to promote linguistic and intellectual growth" (1997:39).

implies that both teacher and learner are aware of the epistemological implications in academic writing.

Odell urges "that we attempt to identify the conceptual activities entailed in the specific writing assignments students are asked to do" (1980: 45). He gives two reasons for this: what may appear to be simple writing tasks may entail complex conceptual tasks, and by identifying these conceptual tasks it may be possible (for language and content lecturers) to offer students greater support in their writing endeavours. He argues that it is not enough to set interesting topics and send students off to the library, "(w) e need to show them some strategies that will help them examine the materials they locate" (1980: 48).

These strategies are not universal – they are discipline specific so it is not possible to equip students with a single heuristic procedure. He thus proposes a pedagogy that includes lecturers in the various disciplines. For the strategies are not ends in themselves. Ultimately he is concerned with the question: "What does one have to do in order to think and write like a biologist (engineer)?" (1980: 49). Clearly this is talk about discourse – and includes epistemological issues. This is a question that could just as well have been the concern of a pedagogue in the social constructivist tradition. So it is not the question that distinguishes him as a process pedagogue, but the manner of dealing with it that he proposes: to analyze the conceptual tasks the individual writer needs to perform, and to devise ways of supporting the learner writer in developing strategies to perform those conceptual tasks.

Shaunessey (1977), also a process pedagogue, was particularly interested in the role of context in the interplay between the individual writer and the outside world. She argued that errors in students' writing were not 'mistakes', but part of the gradual learning process. To be successful writers, students need to become familiar with the discourse conventions which consist of issues of an epistemological nature (for example, ways of evaluating evidence) rather than issues of usage or style. Shaughnessey names aspects of discourse students need to learn that are essentially ethical (such as formal courtesy), and epistemological (such as knowing what constitutes adequate proof).

2.3.3 Writing: "inventing the university"

Theorists to be reviewed in this tradition include Bartholomae, Bizzel and Bazerman. (Spack (1988) although not covered here deals specifically with initiating L2 writers into the discourse community.)

Bartholomae titled his influential article *Inventing the University (1988)*[10] possibly as a comment on the task of students in higher education: "to learn to speak our language, to speak as we do, to try on particular ways of knowing, selecting, evaluating, reporting, concluding and arguing that define the discourse of our community" (1988: 273). "Inventing" is not used in the ordinary sense of making something new that nobody had thought of before, but of making new for oneself, discovering for oneself, what in fact has been there before. This learning to speak and trying on of particular ways of knowing, may require that students have to "dare" or "bluff" their way into the discourse, since they will be required to speak and write the discourse before it is learned (1988: 273). Initially students still lack "the knowledge that makes the discourse more than a routine, a set of conventional rituals and gestures" (1988: 274). Gradually students appropriate the discourse by trying out and taking on the voice of authority, until ultimately, they no longer just mimic or bluff in using the discourse, but use it with ease, as insiders, or members of that discourse community.

In Bartholomae's pedagogy, the role of the teacher is to initiate the students, to guide them in appropriating the discourse, for it is in appropriating the discourse, that students attain authority, or "invent" the university. To speak or write with authority in an academic community requires that the writer use the "code" privileged to members of that discourse community. Bartholomae points out that appropriation requires that the student can "define a position of privilege, a position that sets him against a 'common' discourse, and when he can work self-consciously critically, against not only the 'common' code but his own" (1988: 283). He regards the discourse of a particular community as a set of specifically acceptable gestures and commonplaces. A commonplace is a "culturally or institutionally authorized concept… that carries with it

its own elaboration" (1988:275). Clearly a commonplace has epistemological implications – it refers to ways of knowing and valuing, not just language usage.

Disciplines are ritualized in educational institutions, so students' knowledge and experience "is never freely transcribed but instead is mediated by an 'anonymous system' which produces knowledge and text" (Ball, Dice & Bartholomae 1990:343). The epistemological implications are clear. There is no such thing in the academic community as 'using your own words' as we often admonish students who plagiarize (knowingly or unknowingly). The student's 'own words' (and by implication, own ways of knowing, that is, the common sense way of knowing) are not valued by the academic community. What our exhortations to 'use your own words' thus mean is, to say it for yourself in the manner which is expected, common, in this discourse; say and know it in the way that we say and know it. There is no avoiding epistemological implications when considering discourse.

Teaching must guide students in their "discovery that knowledge is constituted rather than natural" (Ball, Dice & Bartholomae 1990:355). (The title of this article, "Telling Secrets", aptly describes what is required of academics who adopt what in Freirian terms is a "banking" approach to teaching (making deposits of knowledge) or assume that their students arrive in higher education already familiar with the discourse of the discipline. Taylor *et al* (1988) argue in *Literacy by Degrees* that students are not literate in academic discourse on entering higher education, but that they become literate in their undergraduate programme. (Academics who have an 'autonomous text' understanding of literacy – as a universal decontextualised ability to read and write - would assume that students are literate when they enter higher education). Bartholomae's pedagogy of writing emphasizes the social and epistemological aspects of learning to write in an academic or disciplinary discourse, but also acknowledges in turn, the important role learning an academic discourse has on the student's individual identity.

[10] It was first published in 1985 and is better recognised by that date. I use a 1988 publication in Kintgen, Kroll and Rose (Eds).

Acquiring the discourse requires that the individual finds a balance between self effacement and self assertion in composing a text (Ball, Dice and Bartholomae 1990: 348). This applies not only at the level of language, but also in terms of knowledge. It is at the point where language and knowledge meet – when the student has to write - that the challenge lies. Separating language and knowledge cannot be done (although it's common that both students and academics treat clarity as a characteristic of style in writing rather than a disciplinary performance). At the heart of Bartholomae's theory is the integration of epistemological issues with textual issues – clearly beyond the scope of 'language problems'.

Bizzel is another powerful advocate for making academic discourse the focus in the teaching of writing in higher education. In her review of two writing textbooks, she sets out her creed on writing (1982b: 205):

> I believe that all writing is context bound, and therefore cannot be adequately described by universalized models. I believe that all academic knowledge is context bound; therefore the learning situation cannot be adequately described in terms of teachers' and students' personalities. Furthermore, I believe that to neglect these contexts of writing and knowledge is to risk committing a new version of the social injustice attributed to the old composition course.

Her belief in appropriateness to context and the social situatedness of the individual writer is paramount. She goes on also to spell out the relation of the writer, 'the individual mind', to the social, 'community's conventions', as dialectical, rather than oppositional (1982b: 205). This does not mean however, that there is no conflict between the individual and the social – instead she refers to "the essential conflict between the academic discourse and the cultural capital expressed in the prose" (that is, prose of individual writers whose primary discourse may be far removed from that of higher education) (1982b: 195).

Bizzel is quite explicit about the social function of writing. She argues that students from non-traditional backgrounds need to be taught the conventions of academic discourse quite explicitly if they are to gain full access to knowledge – a process that "exposes and

demystifies the institutional structure of knowledge" (1982b: 1 95). She uses conventions not as "rules to be internalized,… the 'constraints' of written English", but to refer to a set of directions for producing a certain kind of text (1982a: 229).[11] Discourse conventions have a generative power, or an interpretive function - they have epistemological implications, in short "academic discourse constitutes knowledge in the academic community" (1982b: 206). What Bizzel in effect says is that if a student doesn't know how to write in a particular discipline, he or she may also not know how to know in that discipline.

But discourses do more than constitute knowledge: they also affect the identity of the writer. She argues that her pedagogy of initiation "will probably require students to think about what kind of person the intellectual work of college seems to be asking them to be" (1978: 353), and that "(w) hatever his or her background, the student who is attempting to master academic discourse is attempting to pass for a member of a particular cultural group who shares this 'common stock' of knowledge" (1978: 354). (Gee was to argue the same point in his theory when he says of a Discourse that it is like an identity kit, "complete with appropriate costume and instructions on how to act, talk and often write, so as to take on a particular social role that others will recognize" (1996: 127).) Bizzel's assertion also implies a certain awareness on the part of the student – either "to think about" or in "attempting to pass for a member", both actions which are certainly deliberate and which directly affect the writer's sense of identity.

Bazerman's interest in academic discourse was largely in science texts, and his work is thus particularly appropriate in this study. Despite his statement that academic knowledge is "cast primarily in written language", he argues that language is not an "inert vessel" (1981:3 61). He does thus not limit himself to issues of language, but refers also to epistemological implications and issues of individual and social identity. The language of knowledge influences the shaping of knowledge and written statements serve specific social functions, including the representation of self, for the "human mind stands between the reality it perceives and the language it speaks in; statements reflect the thoughts,

[11] She makes a distinction between "rules we can formulate to describe behaviour" and "rules that produce behaviour" (1982a: 234). Cf. Cooper's (1990) distinction between convention and practice.

purposes, observations and quirks of the individual" (1981: 363). He makes specific reference to the "overwhelming epistemological difficulties" that would result from a "monochrome analysis" of what he regards as the four domains in writing, namely, language and reality, language and tradition, language and society, and language and mind (1981: 364).

Bazerman regards writing as a constructive activity in which the writer draws on individual schema (personal maps) and perceptions, and consensual knowledge in composing or understanding. Writing in an academic or scientific context is regarded not as an individual, but a social act, for "(d) eciding to integrate another's work with one's own is the core of the communal endeavor of science" (1985: 14). Writing occurs in a public, or social arena –it is not viewed as a process in an individual mind.

Bazerman in claiming that it is necessary to "understand how the professions constitute themselves and carry out their work through texts" (1991: 3), acknowledge the social constructive nature of texts also in professional contexts. In *The textual dynamics of the professions* (1991) Bazerman and Paradis identify what they regard to be the three spheres of influence of texts in a profession: building the profession; performing transactions (including for example, the enrolment of newcomers); and shaping the actions (and identities) of individuals (1991: 5).

Ultimately, what differentiates the cognitivists and the social constructionists is where they deem the focus should be in the teaching of academic writing: on the individual (writing process) or the discourse community (in social action). It is not quite an either or situation, for as Ball, Dice, Bartholomae (1990: 340) argue, we need to question our understanding of the knowledge 'in' students, and knowledge 'in' academic disciplines and the relationship between the two.

2.3.4 Writing: in engineering

The writing theories described above are not based specifically on writing in an engineering context. I thus include a brief reference here to two studies of writing in

engineering, one in a professional context (Selzer 1983), and the other in an academic context (Herrington 1985).

In a study entitled The *composing processes of an engineer*, **Selzer** (1983) uses observation, examination of texts (all final and interim written material) and self recorded responses to a long series of questions before and after each session, to describe how an "experienced engineer who spends roughly half of his time on the job writing", composes (1983: 179). What emerges is an account of a very linear process, with the emphasis on careful planning, confident and efficient writing (without adapting his plan), and very little revision. In the planning he relies on his personal knowledge of his audience to tailor the message, and "almost never will he modify his plan after he has begun to write" (1983: 182). Selzer (1983: 179) concludes that despite the fact that his process is more linear than recursive, "his composing habits are in some ways fairly conventional – he performs distinct planning, arranging, writing and revising activities". What Selzer describes here does not conform to what Bereiter and Scardemalia say about expert writers with good planning strategies, namely, discovering what they really want to say when they reflect on what they have already written or after putting initial thoughts on paper, and being willing to adjust and develop their planning even once the writing has begun (Grabe and Kaplan 1996: 124). Bizzel would account for his confidence and apparent success in writing despite this linearity, saying that clarity in writing comes from experience in a particular context, not from internalizing the conventions of writing, or the correct application of a universal set of writing skills (1982a: 232).

This account of an engineer's experience of writing offers an interesting foil for prevailing theories. It does not conform typically to either school, but reflects both.

Herrington (1985) worked in an academic context using two chemical engineering courses in trying to establish "the role that writing can play to in learning to think and act like a member of, for instance, a community of chemical engineers" (1985: 332). She considered both the students' role and the manner in which faculty created contexts where writing would function as part of the students' learning, part of their initiation into the discourse community.

She suggests that writing difficulties students experience may in fact be the result of the context in which academic writing occurs: contrived, in terms of purpose, audience and circumstances. Students know that the purpose is to be judged or evaluated, that the audience already knows the answer to the question posed, and that the circumstances are artificial, not authentic. By making a comparison between two courses, one a laboratory course in which the lecturer and students performed traditional roles, the other a design course in which the lecturer and students assumed boss-employee roles, she shows that certain contexts are more conducive to learning and writing. Depending on context, student writing differed in terms of: issues addressed, lines of reasoning (claims and warrants), writer and audience roles and social purposes of writing (1985: 333).

This has significant implications for teachers in engineering. Teachers need to be aware just how sensitive students are to the type of 'community' they create in class - teachers influence the nature of the community particularly through the "role they assume and the expectations they project as audience (1985: 356). Herrington does not suggest that a design or simulation context is necessarily better for learning and writing than the laboratory or traditional context, merely that different kinds of writing result because of the difference in context. Both kinds were useful; she concludes that in both courses, "writing provided the occasion for learning a particular line of reasoning by *using* it and for learning a particular social role by inhabiting it" (1985: 357).

Both the process theories and the social action theories seem to imply a high level of awareness on the part of the student (be it of writing and cognitive strategies or social or individual identity and epistemology). The personal style theorists imply that students aware of, and actively seek their authentic voices to resist the oppressive influence of academic discourse; the cognitivists and process theorists imply that students diligently and systematically (albeit recursively) use cognitive strategies to solve problems, drawing on their awareness of how these affect their writing; and the social constructivists imply that students gradually adapt their ways of knowing and saying to position themselves and attain power in the practices of the academic community. I am not sure that students are in fact so aware of these issues. Maybe they are more aware of the looming due date

when they write. But in terms of my methodology, that is not for me to speculate about, or to explain in terms of a particular theory. And so, I hope, I have neither favoured nor prejudiced any of the theories in my review of the literature.

There are however, two issues that emerged from the literature review that concern me. First, the social circumstances in which research was undertaken and theories were developed do not correspond with the reality, my reality, in contemporary South Africa. Although the same changes in student profile have recently occurred here, as did elsewhere during the sixties, the socio-political situation here differs vastly from that in countries where the contemporary theories of writing originated. Despite the universality of trends in student demographics over the past thirty years, there certainly is no universal reality, but unique individual realities. Theories must propose universals, but theories are not 'real'. Peoples' experiences are real. People don't live in or experience theories, but in their realities which are always unique and subjective.

Second, in my experience students do not write or learn to write with the high level of awareness of the issues the various theories maintain they do. They may not be as aware of writing as a 'unique mode of learning' as the theorists claim (and lecturers assume) they are. They may in fact not appreciate its role in their learning and professional development, regarding it merely "as a mindless chore imposed by some martinet" (Bizzel 1982b: 202). But lecturers do not regard themselves as martinets imposing mindless chores on students – the very reason they set (and laboriously evaluate) written tasks is to encourage and contribute to students' learning. And so, it is to learning that I now turn in this review of the literature.

2.4 Language

While language is not directly included in the scope of this study, it is necessary to consider the functional approaches to language which underpin the discourse and writing theories surveyed in this chapter. Ivanic reminds writers that they need to recognize that they are in a "process of self-attribution: forging their own allegiances to particular traditions and sets of values by their language choices" (1998: 3). One needs only recall Kapp's observation that

"In many cases academics are so immersed in their own disciplines as to be unaware of the specificity of the cognitive and linguistic demands they are making" (1998: 28) to see why a literature survey such as this must include – even if selectively – theories of language. The terms discourse and language intersect: the one cannot be excluded in considering the other, nor should they be regarded as contrasts to each other.

Language and discourse cannot be separated from each other in the context of this study – to do so would mean a significant shift to the field of linguistics (or sociology). I am concerned only with a very specific aspect of language: how students learn the (socially determined) use of language (and what they do with it) in a very specialized context – writing in engineering education. Written texts are an important manifestation and elevated form of discourse in higher education and engineering, and as they are composed in language (although they reflect far more than language), it is necessary to look briefly at the view of language that underpins the discourse and writing theories discourse reviewed in this chapter.

I will look briefly at the work of Halliday (Halliday and Hassan 1989, Halliday and Martin 1993) and Fairclough (1989), both of whom use the term discourse to foreground the function of social issues in their study of language. I will then consider Ivanic's (1998) application of their theories to the discoursal construction of identity in academic writing.

Ivanic uses the term discourse to refer to "language-in-its-social-context" (1998: 37), and so precludes a separation of the two, or an implied contrast between language and discourse. It is in this sense that the term language will be considered. My coverage of Halliday and Fairclough is purposefully selective: I focus only on aspects of their theories that are significant to discourse acquisition in higher education.

Halliday proposes a view of language that is functional – it is understood as doing something in a particular context. In a text, language is about meanings (albeit in words and structures). A text is essentially a semantic unit that can be regarded from two perspectives: product and process. But both need to be related to the notion of "social-semiotic perspective" (Halliday and Hassan 1989: 11).

Ivanic (1998) teases out two principles contained in this perspective which are significant to this study. The first is that language is but one of the many sign systems used for creating or conveying meaning, although it is particularly suited to certain purposes or settings – such as formal assessment in higher education. The second is that "all linguistic choices can be linked to the meanings they convey" (Ivanic 1998: 39). There is no possibility of conceiving of meaning in a text separately or independently of the form in which it is worded. In other words, what things are written about (appropriate topics) or what constitutes an acceptable claim, are as much determined by discourse conventions as are decisions about how to write it.

It must be noted also that in Halliday's theory semiotic is qualified or extended to "social-semiotic". Halliday differentiates between the "context of situation" and the "context of culture". Although the context of situation is part of the wider context of culture (Halliday and Hassan 1989: 46), it refers to the immediate environment in which the text functions, while the context of culture refers to the way language has been used in the past – the socio-historic and socio-cultural constraints. When writing, the individual responds to both the context of the immediate situation and the larger, established context of culture. Halliday and Hassan (1989: 15) propose that language functions to convey four types of meaning: the experiential meaning, the interpersonal meaning, the logical meaning and the textual meaning. The experiential meaning refers to the ideas, content or subject matter; the interpersonal meaning to the effect that the speaker/writer has on the hearer/listener; the logical to the logical relations between part of a sentence; and the textual meaning to the semantic, grammatical – that which make it into a text. These four are interwoven and cannot be separated, although it is necessary to look at the whole from different perspectives or angles for each contributes to the overall meaning (1989: 23).

Fairclough argues that we need to conceive of language as discourse or social practice (1989). He represents discourse as consisting of three nesting layers, the innermost is text, which is located within interactions or processes of production and interpretation, which itself is embedded in the outer layer of context or social conditions (1989: 25). The text is inextricable from the processes of production and interpretation through which it exists, and these processes are inextricable from the conditions (local institutional or

socio-historical) in which they occur. The implications of representing language as a social practice are threefold: first, that language is part of society; second, that language is a social process (it is not the same as text, which he regards as a product); and third, that language is conditioned by other non-linguistic parts of society. Fairclough sees text as consisting of social reality and social relations, which as Ivanic points out (1998: 41) correspond roughly with Halliday's ideational meaning and interpersonal meaning.

What people think and do as writers and readers, as speakers and listeners is located in the middle layer, interaction. Fairclough however, expands on the outer layer arguing that it is the cultural context that creates the pressure to conform to the dominant values, beliefs and practices by dint of such conforming being the source of status and financial gain. These values, beliefs and practices are not fixed, but are challenged and changed on an on-going basis.

The change in social context occurs through the actions of people who produce and interpret texts. People have representations or prototypes of things (linguistic and non-linguistic) which he calls "members' resources", or MR, which make it possible to understand the texts. They draw on their MR in producing and interpreting texts, and although MR are "cognitive in the sense that they are in people's heads", they are socially conditioned and include "their knowledge of language, representations of the natural and social worlds they inhabit, values, and so on" (Fairclough 1989: 24).

Ivanic argues that Fairclough's representation of language provides a framework for relating discourse to identity and "texts to other texts" because it is socially constructed and a powerful semiotic medium for the social construction of reality. (1998: 44).

Ivanic (1998) uses Halliday's concepts of experiential meaning and interpersonal meaning to develop her account of the discoursal construction of identity in academic writing. She picks up on Halliday's reference to identity as part of the interpersonal function of language, but argues that it is not restricted to the interpersonal function of language. She proposes that there are three dimensions to social identity that correspond to three of Halliday's macro functions of language. The ideational (experiential) meaning which include a person's values and beliefs about reality, the interpersonal meaning which relates to the perceived relative

status of the persons communicating, and the textual meaning, a person's "orientation to language use" which "will affect the way they construct their message" (1998: 40). Thus she says "Looked at from the other direction, the ideational, interpersonal and 'textual' meanings conveyed by language all contribute towards constructing the participants' identities"(1998: 40).

She draws on Fairclough's representation of language as discourse involving text, interaction (process of production and process of interpretation) and context to account for the way in which the individual constructs identity in academic writing. The individual, who is positioned between the context and the text, uses text (academic writing) in the discoursal construct of identity within a particular context.

Language functions to construct the individual's identity – to present it to the community – but also for the individual to make sense of the community and reality in which she exists. It is thus not a mere vehicle for shunting information, but an essential part of our being in the world and among others – and thus also of ourselves, our identity. We align ourselves with values, attitudes and beliefs, others and things in the world partly through our use of language as a social semiotic. In the case of the academic world this alignment occurs not partly, but largely, almost solely through language - usually in the form of written text, especially in formal assessment. It is this alignment through language that allows students to identify themselves as being engineers. To understand how they become engineers, one must understand the working of language (not at the level of grammar but at the level of social practice, of discourse), and how language is used to accomplish becoming an engineer.

Halliday argues form and content are inextricable, and thus that discourse involves decisions about what to say as well as how to say it. Knowledge cannot exist only as content – separate from its linguistic form. In higher education knowledge is presented or manifested predominantly as written text (it is easily accessible and practical) but there could be non-linguistic manifestations of knowledge as well. These would include acting in accordance with values as opposed to merely writing down the values that are embodied in a professional practice. Knowledge should be conceived of in terms of being, thinking, doing, and writing. While writing is a manifestation of knowledge, writing is not the only manifestation of

knowledge. It is however, as Emig argues, a "unique mode of learning" (1977: 122) favoured in western higher education institutions.

2.5 Learning

By now it should be clear that writing has heuristic powers. Writing is not a mere vessel into which students pour their knowledge, but has a particular role in facilitating the kind of verbal reasoning required of practicing engineers. Because engineers are required not just solve problems, but to share their interpretation of the problem and proposed solutions with others in industry, writing as a mode of learning is valued: writing is "(o) ne way to facilitate student's learning about a subject is to have them write, because learning and articulating are inseparable activities" (Knoblauch and Brannon 1988: 467). Learning is what students do in higher education, and the students' articulating is what lecturers assess. I will look briefly at two questions – what is learning and how students learn before exploring the connection between learning and assessment in an attempt to tie learning with what was said earlier in this chapter about discourse and knowing.

What is learning? Learning is about changing the understanding (and identity) of the individual. This change is not superficial, but fundamental and affects personal identity through new understandings of self, others and the world. (Although some types of learning may be superficial, such learning does not result in understanding and change).

Ballard and Clanchy (1988: 14) argue "that learning in the university is a process of gradual socialization into a distinct culture of knowledge, and that 'literacy' must be seen in terms of the functions to which language is put in that culture". They point out that culture is neither unitary nor static, nor does "knowledge come to the learner in a pure undifferentiated form" (1988: 44). Students may however, take a while to appreciate this. Students, like the one quoted at the start of this chapter, are inclined to consider their learning in rather simplistic terms. But learning or acquiring a discourse is a complex and frustrating task, for students "must learn the exact scope of the territory (the domain of the subject), the means of traveling (the mode of analysis), the boundaries and the manner of speech (the disciplinary 'dialect')" (Ballard and Clanchy 1988: 14).

2.5.1 What students do

But how then do they accomplish this complex and frustrating task? How do students learn? I've often asked students how they learn as part of my course orientation. Their answers seem to indicate that they understood my question to be: how do you memorize? This is so because many students believe that learning is about getting or increasing knowledge, about acquiring information. (Brown, Bull and Pendlebury 1997: 22, Boughey 1997: 3)

When learning theorists answer this question they say that students learn through activities such as reading, thinking, writing, listening, engaging and collaborating with others, observing and imitating (Ramsden 1992, Brown, Bull and Pendlebury 1997).

Contemporary literature on learning generally regards knowledge as something constructed, it exists in individuals and societies, and is not something that exists independently that a teacher can harness and convey to the learner. It is thus the individual (cognitive) construction of knowledge, and/or the social construction of knowledge that results in change. Given the nature of learning, it is not surprising that there is a strong cognitive focus in the literature on learning, although essentially the same distinction that exists between the cognitivists and social constructivists in terms of writing can be found in the literature on learning. Cole (1993) writing about cognition generally, identifies two streams in the range of theories: one, those that follow the normative or 'standard social science practice' approach in which the social sharing of knowledge or social interaction is just another one of the numerous factors affecting individual thought, and two, those that propose that "human cognition consists of the interaction of individual, social and cultural processes that must be studied systematically in terms of all three processes simultaneously" (1993: 399). Despite this classification, one should avoid thinking in terms which reduce learning to something that occurs in the individual mind or the social group – the theories are variously positioned between the two points. Entwistle (1987: 5) provides an alternative classification in which he makes finer distinctions amongst learning theories, going back to behaviourist theories which I have not included in this chapter.

Learning theories in the normative approach (Marton and Saljo 1976, Entwistle and Tait 1990, Meyer *et al.* 1990, 1992, Ramsden 1992,) tend to take an 'internal' approach to learning, talking about learning primarily in developmental terms, or devising taxonomies in which stages through which the individual progresses are arranged hierarchically. The social constructivists (Bandura 1986, Vygotsky 1978, Rogoff & Lave1984, Cole 1993) regard learning primarily as a social activity, largely determined by what goes on outside the learner – that is, determined by social 'tools' and other people.

It should be noted though that this distinction is not dichotomous – the individual develops in terms of what is valued in a particular social practice (and not all individuals within a particular community develop the same way). Meyer's research shows "stability over time" in the individual study orchestrations of first year engineering students in an academic support programme (most were black students who had had twelve years in "an inferior racially determined school education" in which rote learning and memorization were valued) (Meyer, Parsons, Dunne 1990: 245). The extent to which individual approaches are social determined or reinforced is implied in their discussion:

> There are disturbing questions, in particular, about the apparent *consistency or deterioration* of some theoretically undesirable individual study orchestrations manifested in a supportive context *implicitly* designed to improve them. Future research is indicated for this disturbing phenomenon for it suggests that a supportive context on its own is not a sufficient guarantee that students will form the desired deep perceptions about the context and orchestrate their approaches to studying accordingly.
>
> (1990: 267)

The implicitly designed supportive context, while socializing students into a new discourse community, cannot summarily erase the preceding twelve years of socialization at school.

Perry's (1970) model, although presented as a taxonomy, describes the stages in which the individual becomes aware of the contextual and relative nature of knowledge. It

focuses on the stages the individual passes through, but links them directly to the social context and cognitive activities to which the individual is exposed in higher education. The individual's progress is the result of what practices are valued in higher education. In this sense it draws from both streams identified by Cole (1993).

Marton and Saljo (1976) initially differentiated between two qualitatively different levels of processing, a deep approach and surface approach that resulted in qualitatively different learning outcomes, namely understanding and 'reproduction' (cf. Ramsden (1992: 81) for factors fostering each of these approaches). The deep approach is characteristic of a student seeking understanding, while the surface approach is characteristic of a student seeking 'knowledge' (information) to be reproduced or regurgitated. They also referred to a third, 'strategic approach' to learning. In strategic learning the student does what is necessary to attain good grades. Strategic learning is necessary as formal assessment often rewards 'compliance' or repetition rather than actual understanding. Ramsden says that as a result of this strategic approach "a good deal of student 'learning' is not in fact about understanding biology or political science or engineering, but about adapting to the requirements of teachers" (1992: 67).

However, this understanding/reproducing distinction should not be regarded as a dichotomy. A certain knowledge base is required for understanding, and at some point a reproductive style of learning isolated facts becomes the handling and management of knowledge, and "(t) his end of reproductive learning merges imperceptibly into understanding"(Brown, Bull and Pendlebury 1997: 27). In fact, the various taxonomies on aspects of learning (Bloom 1965, Perry 1970, Biggs 1996) all illustrate gradations in learning outcomes from basic, 'reproductive' levels to higher levels of understanding, involving more complex cognitive processes. Even in 'higher' education there is a role for the 'lower' levels. Candy *et al* working in higher education, identify five domains of development for graduates (knowledge skills, thinking skills, personal skills, personal attributes and practical skills) which include "hav(ing) a body of knowledge in the field studied" (Candy *et al* in Brown, Bull and Pendlebury 1997: 37). Learning must however, go beyond having a body of knowledge in the field studied. As Gee (1996) would point out, it's about who you become and what you do with that body of knowledge.

Perry's model (1970) describes levels of intellectual and ethical development of undergraduate students. He suggests that learning is more than the "accretion of facts, fine-tuning and cognitive restructuring" that is implied by many cognitive theories (Bull, Brown and Pendlebury 1997: 28). It involves restructuring one's commitments and priorities, changing one's feelings and attitudes. Although it predates Gee, Perry's model accounts for the development also of values and attitudes, and it thus ventures into the same territory as Gee: Discourse.

> A Discourse is a socially accepted association among ways of using language, of thinking, feeling, believing, valuing and of acting that can be used to identify oneself as a member of a socially meaningful group of 'social network, or to signal (that one is playing) a socially meaningful 'role'.
>
> (Gee 1996:143)

Perry identifies nine levels: the first is where learners seek and expect right answers for everything (in the context of this chapter, they would expect to find an answer at the back of the book). They seek a single universal answer from authority, and operate with a duality of right versus wrong. Gradually students become aware of the complexity and multiplicity of the world, and the relativity of what is 'right' to context, and are able to tolerate dissonance. Learners later learn to make personal judgments and commitments, accepting the implications of those commitments. The final level is attained when learners experience issues of personal identity in understanding that commitment. Perry's model emphasizes the gradual nature of development, and the implication is that students can only cope in a meaningful way with knowledge or problems that are within their range – Wankat and Oreovicz suggest this is one level beyond the actual developmental level of the student (1993: 276).

Wankat and Oreovicz (1993) have more recently applied Perry's theory to engineering students, pointing out that while Perry hypothesized growth to be natural (with many graduating Harvard students attaining levels 7 or 8), growth is not inevitable. They suggest instead, that engineering students are likely to graduate having attained levels 3 or 4, and that "engineering students show little progress towards higher Perry levels and

may actually regress slightly during their engineering studies" (Wankat and Oreovicz 1993: 277)[12]. They also point out how women in engineering differ in their learning from the Harvard men on whom Perry based his findings, referring to the ways in which women's ways of knowing, and their development through Perry's stages differ. [13]

Research by Entwistle and Ramsden (1983) indicates that factors such as motivation and personal learning style, also affect learning. A range of 'inventories' of discrete variables (internal and external) affecting study approaches have been developed – notably the Approaches to Studying Inventory (ASI) (Entwistle and Ramsden 1983), and Qualitative Context Inventory (QCI) (Meyer 1988).

The term "study orchestration" was introduced by Meyer, Parsons and Dunne (1990: 67) to "indicate that the association of constructs that represent approaches to studying at an individual level *is a context-specific response and is affected by the qualitative level of perception of the individual towards certain key elements of learning context*" (original italics).

Meyer, (1991) working with engineers in a South African context, explored the manner in which different individuals perceived discrete aspects of the shared learning environment. He proposes that if differences in the ways in which individuals approached learning tasks were qualitatively different, and that these differences or variations were associated with variations in individual perceptions of the learning environment, it seems logical that varying perceptions of the learning environment could also be ascribed to qualitative differences in perceptions. In other words, "it can thus be logically argued that individual students adopting qualitatively different approaches to studying *in a given context* might also perceive that context in qualitatively different ways" (original italics 1991:300).

[12] They account for this by quoting Florman: "The trouble with engineers … has been their failure to recognise that life is complex" (Florman in Wankat and Oreovicz 1993:178). An interesting thought in a phenomenological study of engineering students: unique *lebenswelt* meets universal reality.

[13] Although four of the six participants in this study are women, gender was not a selection criterion. It is interesting to note however that more that half the students in the final year class from which participants were selected, are women.

Later research in three engineering faculties in South Africa (Meyer, Dunne and Sass 1992) shows the association between a student's learning (and implied success or failure) and his or her individual study orchestration or contextual perceptions. Cliff gives a qualitative review of study behaviour before and during the first year of engineering study at the University of Cape Town and points out that "some 'traditional' first-year students embark on their studies as much 'at risk' academically as their 'nontraditional' counterparts" (1995: 169).

Ramsden also argues that the quality of student learning is "crucially dependent" on the approach taken, and that the individual's approach is a response to the environment (1992: 62). Furthermore, he makes the points that

> In phenomenological jargon', an approach is an 'intentional' phenomenon, in that it is directed outside the individual to the world outside, while simultaneously being defined by that world. It is not something inside a student's head; it is how a students *experiences* education
>
> (Ramsden 1992:62)

Although he identifies four points of relation between student's perceptions and their approaches, (the task itself, the quality of interaction with the lecturers, the curriculum and assessment procedures, and the general atmosphere or 'ethos' of the department, programme and institution) the phenomenological foundation of his argument leads him to conclude that "because of the inevitable gap between our intentions and the students' perceptions of the context of learning" we probably cannot not "instruct students in the use of deep approaches" (1992: 63). His reluctance to prescribe universal ways of getting students to improve learning is significant for it underscores the need for lecturers to consider the unique world of the individual student – the *lebenswelt*. I return to this in the chapter on methodology.

Kolb's experiential theory (1984) initially intended for professional groups but relevant also to student learning, incorporates four phases, and the corresponding learning styles, in a learning cycle. It proposes two dichotomies orthogonal to each other so that four quadrants are represented. The first dichotomy reflects two ways individuals prefer to

transform experience into knowledge, namely active experimentation or reflective observation. The second dimension distinguished two ways of grasping or taking in information, namely through abstract conceptualization or concrete experience. Although an individual may start at any of the four points, and prefer certain modes of operation to others, a proficient learner goes through all four stages.[14]

In all these theories, the focus tends to be the individual's construction of knowledge – albeit with due regard for the context in which the student learns. In social constructivist theories of learning the point of departure is that knowledge is socially constructed and learning theories in this school of thought focus on the social structure and function of the activity and the constraints on it.

Vygotsky argued that learning is socially elaborated, and that it is through interaction with adults and other children (in the context of this study it would be professionals and other students) that the individual is able to go beyond 'development'. To Vygotsky the difference between development and learning is crucial. The question about the relationship between development and learning led to the development of the concept of 'Zones of Proximal Development' (ZPD). The ZPD is the critical area or 'gap' where change, growth, learning is possible: " It is the distance between actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (1978: 86). In addition to the interaction between people, learning is also affected by the socio-cultural context in terms of the tools (for example writing) and practices that facilitate cognitive activity. Higher mental functions are thus socially formed and culturally transmitted.

Schön (1983, 1988), working in the broad social constructive tradition, examined learning in professional (as opposed to academic) contexts and proposed the notion of the 'reflective practitioner'. He regards learning in a professional context in terms of framing and reframing complex and ambiguous problems, and interpreting and modifying one's practice accordingly. He makes a distinction between reflection in action (on the job

[14] Cf. Wankat and Oreovicz (1993: 296) for a discussion of engineering students' preferred learning styles.

decision making) and reflection on action – that which leads to learning in a professional context.

2.5.2 What lecturers do

One cannot consider learning without also referring to assessment. Ramsden puts it quite plainly:

> Whatever we may say about our ambitions to develop understanding and critical thinking in our disciplines, it is in our assessment practices and the amount of content we cover that we demonstrate to undergraduate students what competence in a subject really means. There, starkly displayed for students to see, are the values academic staff attach to different forms of knowledge and ways of thinking (Ramsden 1992:77).

How students learn is determined by how lecturers assess: "(a) ssessment defines what students regard as important, how they spend their time and how they come to see themselves as students and then as graduates" (Brown, Bull and Pendlebury 1997: 7). The implication of this is that by changing assessment, it is possible to change student learning. This is why writing is a "unique mode of learning" (Emig 1977: 122) - learning being of the kind valued in engineering education and practice, which "supports reasoning about engineering phenomena" (ECSA 1999: 4). If in assessing students we require them to write rather than memorize, a different type of learning is called for. If one accepts Knoblauch and Brannon's position that "knowing is an activity, not a condition or state, that knowledge implies the making of connections, not an inert body of information, that both teachers and students are learners, that discourse manifests and realizes the power to learn," and that teaching is thus not "reporting of data" (1988: 467), then one must also accept that assessment cannot be the "reporting of data" by students to lecturers in exchange for marks.

Just as there is a connection between learning and the assessment that fosters it, there is a connection between learning and the knowing that results from it. Bartholomae points out that one knows things differently if one has written it (in a 'long' text – not one-liners), and therefore, "(w) hen there is no writing, then the shaping of knowledge is of another sort altogether"
(1986: 2).

2.6 The double edged sword: Discourse, Writing and Learning

When one considers the literature on discourse, writing and learning, one becomes aware of a 'sorting' of people into two categories: 'insiders-outsiders', 'experts-novices', 'deep learners-surface learners' - and their very different respective fates in higher education. At the end of this literature review I have a great sense of higher education being like a double-edged sword.

Discourse, writing and learning act as a double edged sword in higher education dealing with students in two very different ways: on the one side, as the unspoken codes giving epistemological access; on the other, as the invisible gate-keepers closing off access to higher education and the material goods that go with it. Ultimately, which side of the sword he or she is to face is not left to fate, but decided largely by the student's primary Discourse. [15]

And so, in contemporary South Africa, the story of discourse, writing and learning does not always have a happy ending. Comforting as it would be, I cannot fully agree with the sentiments with which Leki (writing about her ESL experience) concludes the preface to her second edition of Academic *Writing* (1995: iv):

> This book takes student writing seriously and trusts students to be intellectually alive, to appear in the classroom with a store of experience and information that they are willing to share and that is worth sharing. In many years of teaching, I have not found this trust to be misplaced.

These are noble sentiments and likely to have universal appeal[16] so, when I say I cannot agree, I must explain.

[15] I say this cautiously and without affording group membership more influence than individual agency. (Cf. Cliff 1995, Thesen 1997)

[16] In terms of a Widdowsonian analysis of the role of language, students just lack surface level skills in English, a situation remedied by 'topping-up' their English. As Starfield points out, in the South African

I too, take student writing seriously. I too, trust students to be intellectually alive. But I cannot agree unconditionally that they "appear in the classroom with a store of experience and information that they are willing to share and that is worth sharing". First, they do not "appear" in the classroom, like so many white rabbits from a hat. I recall a recent time when the law prevented them from appearing in my classroom at all.[17] Their appearance now in higher education, in my classroom, is a hard won victory both collectively and individually for African students - most are first generation students, and some the children of parents who are 'illiterate' in the traditional, 'UNESCO universal literacy' sense (Geisler1994: 3). Second, the experience and information they bring with them is often from a life far removed from that of both higher education and engineering. Their schooling experiences are poor; their information inadequate for the demands of higher education[18]. Third, and possibly saddest of all, is their unwillingness to share. It is precisely their awareness of their past experience and information that makes them unwilling – even unable - to share, to speak in classrooms where they feel another discourse is valued. And so they do not share, for they feel their experiences, their information, their discourses, are not 'worth sharing' in their new classrooms. (This is not the same as saying they as individuals are not worthy – it is their "experience and information" that are unequal[19] with the experience and information of those for whom the higher education classroom was designed).

---

context "it is far from clear that students are in possession of either the underlying science skills or the language skills" (1990:88). This means we need to respond to their learning needs generally – which include, but go beyond 'language'.

[17] Beginning with the 1959 Extension of University Education Act, there were various laws and amendments promulgated during the apartheid era that controlled access to higher education institutions in terms of race. In 1983 the Universities Amendment Act made provision for a designated white university to admit "persons of a population group or population groups … other than that of which the body of a relevant university mainly consists…"(Section 16, Act 84 of 1983) subject to a quota control. Although certain institutions ignored the quota regulation and admitted more than the allowable numbers of black students during the eighties, the statute was to remain until the new dispensation in the nineties.

[18] Numerous academic development programmes were developed to 'close' the 'gap' (usually maths, science and English) between what students were bringing to the classroom with them, and what was expected of first year students.

[19] Over the past decade much has been written about the inequalities of separate education in SA, and its affects on individuals. (Badat, Wolpe and Barends 1994, Ramphele 1994). It will be many years before inequality is no longer a concern in education. For example today's *Mail &Guardian* (21 July 2000: 21) runs a report entitled *Education inequalities persist*.

Declaring an intention to value what students have to say because it is different (a 'celebration of diversity') amounts to a Pollyana-ish response to significantly changed social situations not always appropriate in higher education. Meyer's research is clear about the fate of University of Cape Town students who are 'different' in terms of their learning: they fail. This social change calls for serious reflection and hard work from teachers and institutions, and not merely for joyously acknowledging – 'celebrating' – the diversity among the students. Yes, I value the individual as a unique and different person, but I also have a responsibility to evaluate which, along with development also implies judgment. It is precisely because I value the individual that I am not going to celebrate (yet), but reflect and act to ensure that my academic responsibilities are fairly performed to individuals from different backgrounds. I must act in a manner that preserves the dignity and integrity of the individual. But I cannot act in a manner that disregards or circumvents the prevailing discourse in higher education. When it comes to academic discourse, diversity is not much celebrated.

In my experience, sentiments such as Leki's just don't hold in engineering education in contemporary South Africa. But this study is not about my experience, it is about the students' experience, and it remains to be seen whether her (or any other) theory accounts for their realities.

Chapter Three

Methodology

3.1 Introduction

Although phenomenology as a methodology is traditionally associated with research in psychology (see, for example, Van Kaam 1969, Farber 1966, Kruger 1988, Giorgi 1984, 1994, Van den Berg 1972), it has also been successfully applied in other fields, including educational research (Moustakas 1994, Stewart and Mickunas 1990). In fact, it is eminently suitable for educational research for three reasons that I argue later in this chapter. I begin this chapter with a brief overview of phenomenology as a methodology, highlighting key concepts and processes, before going on in the second section to discuss concepts in greater detail, justify my choice of phenomenology and point out why it is suitable in this particular study. The chapter concludes with a discussion of the methods and procedures used in preparing the study, collecting, analyzing and synthesizing the data.

It may be useful to preface this chapter with a consideration of the term method in a phenomenological context. Where method may, in a different approach refer to a "specific sequence of technical procedures, and algorithm, deigned to protect the investigator from error and insure (sic) the production of reliable knowledge," such an approach would have limited use in phenomenology where the 'object' of study is consciousness (Polkinghorne 1989: 44). Phenomenologists are inured instead, to expect no more of a method than an outline or guideline, and to develop plans of study appropriate to understanding the particular phenomenon under investigation. Furthermore, the problem giving rise to the investigation may itself not be well defined, and may need to be "discovered, rather than known *a priori*" (Giorgi 1994: 214). Method and problem are closely related: just as there may be no clear *a priori* problem, there may be no clear algorithmic method to describe with the confidence that it will be followed, at this stage in a phenomenological study. Giorgi says of the methodology:

> The problems of methodology cannot be considered in isolation, but only within the context of the phenomenon to be investigated and the problem aspect of that phenomenon. These three things, the method, the phenomenon, and the problem aspect of the phenomenon must be dialogued continuously and no one of them can be considered to the total exclusion of the others.
>
> (Giorgi *et al.* 1971: 11)

So this chapter offers a tentative plan in the knowledge that as the study develops it may change.

3.2 Phenomenology – an overview

The focus of this chapter is on phenomenology as a method rather than the Husserlian philosophy, but it is unavoidable that I begin with some reference to its underlying transcendental philosophy. The purpose is to give some background and a general sense of what phenomenology is.

3.2.1 Philosophical background

In attempting to determine what can be known with certainty, Descartes created a duality between mind and body, setting them up as two mutually exclusive categories. He argued that only what existed in consciousness could be depended on with certainty, and resolved that there should be no science other "than that which could be found in myself" (Descartes in Moustakas 1994: 44). Accordingly, objective reality could only be known subjectively: knowledge is thus possible only through the subjective sources of the self. Later, Kant (in Moustakas 1994: 44) postulated three such sources: "sense (phenomena empirically given in perception), imagination (necessary to arrive at a synthesis of knowledge), and apperception (consciousness of the identity of things)".

This Cartesian duality which set up a dichotomy between object and subject, dogged western philosophy until the late nineteenth century when Husserl overcame the dilemma of the Cartesian duality and its 'either-or' distinction in his phenomenological philosophy. He argued that consciousness was always consciousness of something, that

it is always intentional, always directed towards an object. In consciousness the subject and object are unified. There is what Stewart and Mickunas (1990: 9) refer to as "an indissoluble unity between the conscious mind and that of which it is conscious". It is through intentionality that we get from consciousness to phenomena.

3.2.2 Consciousness, intentionality and phenomena

Husserl regarded intentionality as more than just a causal relationship of the subject to objects, "but an activity of consciousness which is identical with the meant object" (Stewart and Mickunas 1990: 8). According to Giorgi (1994: 203) intentionality "means that all acts of consciousness are directed to objects that are not those acts themselves".

Through intentionality the subject and object dichotomy is thus collapsed, and in consciousness the two poles of *cogito* (thinking) and *cogitatum* (content) are unified. What matters is the meaning of the phenomena as they appear in consciousness. Attention thus shifts from the issue of whether a thing exists, to what its meaning is to the person experiencing it. Thevanez says:

> to make the world appear a phenomenon is to understand that the being of the world is no longer its existence or reality, but its meaning, and that this meaning of the world resides in the fact that it is a *cogitatum* intended by the *cogito*.
>
> (Stewart and Mickunas 1990: 10)

Husserl admonishes us to return 'to the things themselves', to view the world as phenomenon. This requires a significant shift from the 'natural attitude' or common sense interpretation of the world, to the 'philosophical attitude', a shift he refers to as the process of 'phenomenological reduction' (Stewart and Mickunas 1990: 26). This will be discussed in a later section.

The question of whether a thing exists in the 'real' world does not concern a phenomenologist – what matters is whether it exists in the conscious awareness of the

subject. The things that exist in consciousness within us can thus be taken as actually existing without recourse to further evidence. Phenomena are just that – the "things in consciousness that appear in the surrounding world" (Moustakas 1994: 44), and in them experience and knowledge are inevitably united. The self as knower and the object known are unified in consciousness.

What is actual in experience is knowable. Husserl asserted:

> For me the world is nothing other than what I am aware of and what appears valid in my *cognition* …I cannot live, experience, think, value, and act in any world which is not in some sense in me, and derives its meaning and truth from me.
>
> (Moustakas1994: 45)

Awareness in the consciousness of the subject, the person experiencing - in this case, the learning to write and think in an engineering context - constitutes reliable evidence. As pointed out above, consciousness is always intentional. Van Kaam in advocating phenomenology as a science claims that it "formulates explicitly what was experienced implicitly in awareness" (1969: 316).

3.2.3 Transcendental phenomenological reduction

Phenomenology thus begins with the awareness of the subject – an awareness that is uncoloured by the researcher's interpretation. As a methodology it aims to obtain as data "crude, spontaneous or prescientific explications made by untrained subjects" (Van Kaam 1969: 325) which must be analysed also without recourse by the researcher to an interpretive framework. The researcher in the analysis thus focuses on the "explicit awareness of his subjects" (Van Kaam 1969: 325) rather than his or her preferred theoretical interpretation. This deliberate avoidance of a presupposed theoretical framework in the analysis is possible through a process of transcendental phenomenological reduction.

To be able to perceive the subject's explicit awareness, the researcher must approach the data from a stance of "conceptual silence" (Stones 1988:142). This involves a process of reduction that begins with the suspension of the 'natural attitude' – the ordinary commonsense way of knowing things – because it is too confining and will inhibit a return 'to the things themselves' (the phenomena), but lead instead, just to letting us see what we presuppose.

Transcendental phenomenological reduction is a central concept in understanding the methodology and all three terms contained in the concept need to be unpacked as they give crucial insight into the aims of phenomenology.

The reduction is **transcendental** as it goes beyond the 'natural attitude' or the everyday understanding of things, and requires that the researcher "perceive(s) everything freshly, as if for the first time" (Moustakas 1994: 34). Nothing is taken for granted – also in this study, not any theories of discourse acquisition and writing, no matter how universal they may be. It adheres to what can be discovered through reflection on subjective acts, and not to what is given or known in the 'natural attitude', hence, the "conceptual silence" (Stones 1988: 142). According to Gurwisch reflection begins "by rendering explicit the universal 'presupposition' which underlies all our life" (Gurwitsch cited in Moustakas 1994: 47). The researcher, rather than claiming to have no presuppositions, must make explicit and suspend or bracket any assumptions or presuppositions based on the 'natural attitude'.

The reduction is **phenomenological** as it transforms the world to 'mere' phenomena**, that** is, intentional objects that appear in consciousness. But, in terms of the Husserlian philosophy, what appears in consciousness must be taken as "absolute reality" (Moustakas 1994: 27). Whether it is 'real' in the worldly sense or not, is not an issue, for whatever appears in the consciousness of the subject is a valid phenomenon.

Finally, it is a **reduction** because it "leads back to the source of the meaning and the existence of the experienced world (Moustakas 1994: 34). What remains after the reduction – the residuum – is the interface of consciousness and reality (Hintikka 1995: 86), that is, consciousness as well as the objects of consciousness. Consciousness with its intended object remains, for, as Stewart and Mickunas point out, the phenomenological reduction "cannot bracket human consciousness, for the very act of bracketing assumes it" (1990: 36). Consciousness can never be empty – it is always intentional and therefore, consciousness of something. Giorgi states (1994:203) that intentionality "means that all acts of consciousness are directed to objects that are not those acts themselves".

Husserl uses the three terms 'phenomenological reduction', 'bracketing' and 'epoche' interchangeably to refer to what happens during the process whereby consciousness is "extricated" from naturalistic assumptions. This transcendental or phenomenological reduction differs from eidetic *reduction* which involves the further reduction of consciousness "to its essentials by excluding all considerations not pertinent to a particular essence" (Stewart and Mickunas 1990: 40). Eidetic reduction refers to the process of moving from a variety of textural description (of specific experienced incidents) to a structural description (of the essence, the necessary and sufficient constituents of the experience) (Polkinghorne 1989: 51).

I will return to the nature of transcendental phenomenological reduction when it is discussed again in the section dealing with method and process. Suffice to say here that the manner in which the researcher engages with the data differs significantly from other inductive approaches in which the researcher attempts to generalise from a sufficient number of instances – in a phenomenological study even one instance would be sufficient to 'see', that is, apprehend, the essence, what Polkinghorne calls "the principle and inner necessities of a structure" (1989: 42). Phenomenology differs also from other qualitative methods where the researcher takes an interpretive role (Giorgi 1992, Kvale 1996, Petersen 1994). (The difference between description and interpretation will be discussed in the next section.) A phenomenologist avoids interpretation because it can only be

done in terms of an *a priori* theory. The phenomenological bracketing or epoche requires the suspension of any *a priori* theory thereby limiting the researcher to description only.

It is the process of bracketing that allows the researcher access to the subjective, lived world, or *Lebenswelt* of the other instead of having to interpret the subject's life world from where he or she stands as researcher. It means that the researcher need not make claims about the reality of the subject, but, through the *Lebenswelt* can explicate[20] the meaning of those reality claims as made by the experiencing subject.

The purpose of the transcendental phenomenological reduction is thus to gain access to the *Lebenswelt*. It is like the bottle marked 'drink-me' that Alice found when she needed to shrink to fit through the little door. The *Lebenswelt* will be discussed in greater detail in the next section.

3.3 Justification of the phenomenological method

In this section I will continue with a discussion of the phenomenological method by justifying my choice of it for this particular study. There are essentially four such reasons:

- To understand the phenomenon from the point of view of the subjects' concrete bodily experience;
- To allow the subject's unique and holistic perception to emerge;
- To avoid speculative interpretations based on an *a priori* theoretical framework;
- To access the consciousness of the subjects (the phenomenon – consciousness - is an activity which can only be known in particular ways (Polkinghorne 1989: 45). Anything other than description from the subject's point of view, would amount to interpretation)

[20] 'Explicate' in a phenomenological sense has a particular meaning, and is not used interchangeably with explain. Van Kaam (1969: 316) defines it as the "process of formulating explicitly what was experienced implicitly in awareness". It thus begins with the awareness of the subject, and is uncoloured by interpretation.

These four reasons respectively introduce four concepts - *Lebenswelt*, intentionality, description and transformation – which distinguish phenomenology from other inductive qualitative methodologies. It is to these four that I now turn to justify my choice:

- *Lebenswelt, because* it allows the researcher to understand the phenomenon from the subject's point of view;
- intentionality, because it accommodates the uniqueness of perception;
- description, because it allows the data to speak for themselves;
- reflection (and transformation), because it allows me as researcher access to the subject's experience.

3.3.1 *Lebenswelt*

While accepting the existence of a reality independent of consciousness, the task of the phenomenologist is not to explain that reality, "but to describe the nature of reality as taken up and posited by the research participants" (Giorgi 1994: 203). As phenomenologist I am interested in the reality claims as they are made by the subjects - what reality is like for them. I am interested not in the world for its own sake, but in their lived worlds, their *Lebenswelt*.

The effect of the methodology of the natural sciences on the human sciences has left the status of this subjectively experienced world of the individual as a valid source of data rather tarnished in some circles. Kvale (1996: 54) actually talks about "a rehabilitation of the *Lebenswelt* – the life world – in relation to the world of science" that can occur in an interview in which the focus is on obtaining unprejudiced descriptions.

However, in phenomenology the *Lebenswelt* is deliberately emphasised to distinguish it from the uncentred and so called objective world of science and traditional research. Spiegelberg (1975: 260) defines the *Lebenswelt* as "the everyday life world of the ordinary person, which is so different from the objectivised world of science". He points

out though, that while focusing on the spatial and emotional characteristics, the *Lebenswelt* was regarded by Husserl not as an end in itself, but was introduced as a means of returning to the fundamental layers in subjectivity (ibid: 260).

Having defined the *Lebenswelt,* it is necessary to consider its significance in this study. The *Lebenswelt* is significant as it contextualises the phenomena (Stones 1988: 149). It is only through the Lebenswelt that we have access to "the basic experiences of the world of which science is the second order expression" (Merleau-Ponty cited in Kvale 1996: 54). So, the *Lebenswelt* is neither an invalid, nor a diluted or tainted version of the 'objective' world: it is in fact, an essential construct which allows us to have access to phenomena as opposed to 'real objects'.

As phenomenologist, I am not interested in the object (real or otherwise), but in the subject's intentional awareness or consciousness of the object, that is, the phenomenon. This is not to imply that I retain the subject-object dichotomy. In the phenomenon the subject as knower and the object, the known, are united. The knower is intentionally directed at the object – in consciousness they are not two separate things. This means that every phenomenon is unique – no two persons would experience, or know, the same object in the same way (Van der Mescht 1996: 42).

This acknowledgement of the uniqueness of the lived-world, takes us back to the issue of intentionality. Intentionality is never passive – consciousness is characterized by its directedness at that which it itself is not. This means it is given in consciousness for a subject to want to form meaning, and so to constitute the objects. Kockelmans (1967: 35) declares that in attempting to discover our presence to things in the world, which is inseparable from self presence, we find the essence of intentionality.

The uniqueness of the *Lebenswelt* is the result of every intentionality consisting of two aspects: a *noema, the* perceived meanings or the appearance of the real object, and *noesis* (Moustakas 1994: 29).

3.3.2 Perception and intentionality (the noema and noesis)

Before looking at these two aspects of intentionality in greater detail it is necessary to consider the act of perception itself, for in phenomenology it is "the primary source of knowledge, the source that cannot be doubted" (Moustakas 1994: 52). Perception relies on intentions and sensations to make meaning – this combination leads to the almost paradoxical power of perception: we can perceive more than our sensory experience allows at any one time.

Although any object is ever only given one-sidedly in experience, that is, one aspect at a time, we are able to build a continuum of aspects, that forms a unity in consciousness. Van der Berg (1972:29) illustrates this with Husserl's example of a matchbox. It is impossible to see more that three – maybe four – of its six sides at a time. Yet we have access, can visualise a complete six-sided matchbox with ease. Farber comments on this saying: "An all-sided perception is unthinkable. *Perception wants more than it can grasp qua perception"* (1966: 113).

This is possible because, despite the single-aspect nature of spatial objects, our intentionality adds other possible horizons or aspects, and does not allow 'closure' based on the single aspect only.

> We have the aspect, which happens to be actual, and from that point out a horizon which we see to be a multiple continuum of possible perceptions. The possible perceptions are not however actually there for us as real. They are not given as reproductions; they are given as 'indications', as empty intentions. This is fulfilled for us through acts in which we actually perceive further; and this actual perceiving further, which occurs when we attend to an object, amounts to following up the object in a series of perceptions
>
> (Farber 1966: 114).

We have one aspect visually, but in consciousness we are drawn to more. This happens because of the intentionality of perception – to obtain a manifold of aspects to make a unity. Farber concludes his succinct description of perception by saying that "in the

striving process of perception we have awakened intentions, or tendencies to fulfilment" (1966: 114).

Intentionality is what drives perception, but it is itself a complex concept that needs explaining. Intentionality has two aspects: the noema and noesis. Husserl makes the following distinction between noema and noesis:

> *What is the 'perceived as such'? What essential phases does it harbour in itself in its capacity as noema?* We win the reply to our question as we wait, in pure surrender, on what is essentially *given*. We can then describe 'that which appears as such' faithfully and in the light of perfect self-evidence.
>
> (Husserl in Moustakas 1994: 30)

The "*perceived as such*" is the noema, while the noesis lies in the "perfect self evidence". Husserl points out that intentional experience is always noetic as "it is its essential nature to harbour in itself a 'meaning' of some sort, it may be many meanings" (in Moustakas 1994: 29). The noesis is the act of perceiving, or remembering, or judging or feeling or thinking – "all of which are embedded with meanings that are concealed or hidden from consciousness" (Moustakas 1994: 69). But noesis is always directly related to a noema, to that which is perceived, remembered, judged, felt or thought.

The noema is not the real object but the phenomenon or appearance of it, perceived always from different angles or horizons. While the real object – for example, a house - exists in time and space, the noema exists in consciousness. A synthesis of noemata, all from different angles or horizons, is built up during the noematic phases and ultimately makes it possible for the individual to obtain an overall, unified view of the phenomenon - the whole house, inside-outside, day-night, North-South, rain-sunshine - although it is not possible to see (in appearance) more than one horizon or angle of the house at a time. It enables the experiencing person to perceive the house as that particular house rather than some abstract, non-existent 'ideal house' or any other specific house that exists in time and space.

Although the noema and noesis are differentiated, it is necessary to move between the noematic and noetic phases throughout a phenomenological study and ultimately to unify the noema and noesis to "arrive at the essences of a phenomenon" (Moustakas 1994:74). This movement between the two applies also to description as will be discussed below.

3.3.3 Description

Description is the primary method of rendering or presenting the intentional experience of the subject in phenomenology. Although much is made of intentionality and uniqueness, it needs to be made quite clear that in phenomenology this does not lead unavoidably to relativism. Phenomenology's avoidance of the relativism associated with a hermeneutic approach is one of its distinguishing characteristics and sets it apart from other qualitative methodologies[21].

Phenomenologists are admonished to "remain true to the facts as they are happening" (Van den Berg 1972:64). This means that a phenomenologist must describe what presents itself, as it presents itself – no more and no less. This necessitates the bracketing or reduction previously discussed.

Giorgi bases his definition of description on that of Mohanty, saying "description is the use of language to articulate the intentional objects of experience within the constraints of intuitive or presentational evidence" (1992:121). Interpretation on the other hand, is defined as "the development of a plausible but contingent line of meaning attribution to account for a phenomenon" (Giorgi 1992:122). Description and interpretation are both concerned with meaning – in description it is based on the object as experienced, while in interpretation it is based on a plausible but contingent (and hence arbitrary) theoretical perspective.

[21] Petersen (1994) advances a strong argument showing how phenomenology avoids the relativistic quagmire that assails interpretist methodologies.

In this study a hermeneutic approach would pose a major problem. Depending on whose/which theory one uses, one would get differing accounts - some incompatible with each other - of what students are experiencing in learning to think and write. Which theory is to take precedence over any other? There is no given exclusivity among them (hence the charge of arbitrariness). Either I must grant every theory the same status in interpreting my data (this would result in a never-ending contradictory hash), or I must grant none any status. My position is to grant no theory *a priori* acceptance.

Because it is the goal of phenomenology to arrive at an "essential structural description" it is imperative to stay with a "clarification of identity" rather than venture to offering a single plausible, but contingent, account from among various other plausible accounts (Giorgi 1992: 123). In this study I will describe, not interpret, not attempt to explain.

Much criticism is levelled at descriptive science from an interpretative point of view, but Giorgi (1992) answers these criticisms astutely, particularly the charge that description seeks to determine 'the' meaning of an experience. Because a phenomenologist acknowledges the ambiguity and plurality in meaning for the subject, there is no need to determine a 'univocal' meaning. The researcher must just stay with the evidence – which is itself likely to be ambiguous and complex - for it is in seeking unity that the temptation to go beyond evidence to interpretation, arises. Van Kaam (1969: 325) points out that it is in fact, necessary to obtain a number of varying descriptions to increase the possibility that the necessary and sufficient constituents of an experience will emerge.

A phenomenologist must begin with what is given in experience - just as that experience is. Beginning with questions about the nature and quality of the phenomenon, **a textural description** is developed which covers the 'what' of experience. It constitutes the noematic phases as described above, and includes all sensory aspects. Moustakas (1994: 78) states that "In the textural description of an experience nothing is omitted; every dimension or phase is granted equal attention and is included". But, to determine the essence of a phenomenon, it is necessary also to develop a **structural description** which goes further than the textural description by describing how the phenomenon is

experienced, and focussing on "the conditions that precipitate the textural qualities" (Moustakas 1994: 78).

The move from naïve or textural descriptions to structural descriptions is called eidetic reduction, a process in which the particular or specific instances are bracketed in order to grasp the structural principles. It is sometimes also called *"thematization"* because it involves identifying the constituents or themes present in the textural descriptions (Polkinghorne 1989: 51).

Giorgi tells us that structure clarifies what textural description (the presentational or perceptual) could only adumbrate (1979: 88). He quotes Merleau-Ponty (Giorgi 1979: 87) saying: "structures could not be defined in terms of reality, but in terms of knowledge, that they were not physical realities but objects of perception, that structures could not be defined as things of the physical world, but as perceived wholes."

Structures do not exist in reality, they exist in knowledge and they must thus be arrived at through reflection. Giorgi specifies that this is achieved through "free imaginative variation" (1994: 124). This is a complex concept – by imaginative he refers to 'non-actualised' possibilities, as opposed to actualised possibilities, that is those that occurred. Facts are actualised possibilities. It is necessary to reflect also on the non-actualised, that is, on the possible, to get the invariant, the essence. So while textural description is prereflective and intuitive, structural description is reflective – it correlates with the noetic phases. Structure is implicit in texture; it is "that order embedded in the everyday experience which can be grasped only through reflection" (Keen in Moustakas 1994: 79).

A synthesis of the textural and structural description constitutes the essence or meaning of the phenomenon. Ultimately, description is part of the ongoing search for the invariable essences or meaning of the phenomena.

The essence quite simply, is what phenomenology strives for – to get the "true nature" or "most invariant meaning for a context" (Giorgi 1994: 214). It is from the invariant, that

what is persistent, enduring and essential emerges. It is thus necessary to draw on more than just the actualised possibilities in forming the essence, the possible possibilities need to be considered as well, for facts could have been actualised in other ways. In referring to the way things may vary in experience, Farber says "there persists that which is not and may not be transformed" and, that "whatever persists in that way is held to be *essential* to the thing in questions" (1966: 52). It is thus that phenomenological description in this essential sense "is held to be valid with unconditional necessity" (Farber1966: 53). The process of intuition and reflection through which the essence is arrived at will be described briefly below.

3.3.4 Reflection and intuition

Although phenomenology like many other methodologies is both descriptive and qualitative, it differs from them because of its "special realm of inquiry" (Polkinghorne 1989: 45). The focus in a phenomenological study is on the subject's experienced meaning instead of overt action or behaviour. It is not concerned with outside reality (as is the case in other descriptive methodologies – for example, ethnography) and cannot be observed as objects in the real world can. A phenomenologist needs a way of gaining access to the perceived experience of the subject.

Intuition[22] differs from experience: its primary function is "to call attention to what is immediately given to us in experience" (Hintikka 1995: 86). Experience is limited to material, empirical objects only, but intuition refers to any object in consciousness – whether perceived or imagined – and in any mode. Ideation is one such mode. Ideation is a mode of consciousness referring to " the presence to consciousness of objects he (Husserl) calls ideas or essences" (Giorgi 1994: 217). It results in the transformation of empirical experience into essences – the mingling of an object in consciousness with the object in nature to create meaning (Moustakas 1994: 27).

[22] Intuition in the phenomenological sense should not be confused at all with the ordinary sense of 'intuitive', but comes instead from Husserl's term *anschauung*. (Hintikka 1995:86).

A phenomenologist thus grants ideas present to consciousness the same status as material things present to consciousness (Giorgi 1994: 217). This results in a distinction between experience (the presence to consciousness of material empirical objects) and ideation the presence to consciousness of ideas or essences), but it must be recalled that what appears in consciousness is an 'absolute reality' to the phenomenologist.

Lebenswelt, intentionality, description and reflection are the four characteristics of phenomenology that make it an appropriate methodology for this study. In discussing each of these characteristics I have referred to – or implied - a notion of the individual as a unique, active, intentional agent engaged with the surrounding world. An individual is seen as constituting his or her own world and perceiving intentionally. I believe phenomenology allows me to regard myself as a researcher as well as my participants in these terms.

Husserl points out that only in relation to the subject are there 'appearances' and that only subjects engage in 'producing' activity and only subjects provide a point of orientation in which frameworks of time, space and motion can be anchored. We are faced with an 'individual subjectivity' and the subject is regarded as an "absolute individuator" (Smith 1995: 422). The individual subjects are not regarded as a "mere *examples of universals'* (Smith 1995: 422) or as "rats in a maze" but as intentional experiential beings who are fully present (Stones 1988: 146).

No attempt is made to eliminate subjectivity in phenomenology. Giorgi points out that while "subjectivity in the pejorative sense can be transcended", the real concern is with deciding "how subjectivity should be present" (1994: 205). By first explicating my intentional consciousness through the process of reduction in which impinging beliefs are temporarily disengaged, I can understand what is not myself, the co-presence of the other's intentional consciousness Moustakas (1996: 37).

It is to my interaction with unique individuals that I turn in the final section where I describe how this study was set up.

3.4 Methods and processes

3.4.1 Description, reduction and the search for essences

Before discussing the methods and processes I used in this study, it is necessary to give a consolidated account of the phenomenological process. Giorgi (1994) identifies three phases – or tasks - in the process: description, reduction and the search for essence. Other accounts (Stones 1988, Giorgi 1979 and Van Kaam 1969) give four, five or six phases or steps respectively, but fundamentally they are expanded phases of the same three tasks. Where in previous sections description, reduction and the search for an essence were discussed in different contexts, I hope in this briefer section to present the three phases as interrelated phases of the phenomenological method. Although they are discussed here as three distinct phases, description and reduction ultimately stand in service of finding the essence or meaning of a phenomenon.

Description

To use a metaphor borrowed from commerce, the 'core business' of phenomenology is description. Description is "the linguistic articulation of the intentional objects of experience" (Giorgi 1994: 211). The language of the description needs to capture the meaning of the participant, but it needs to be "taken up and re-expressed in the language of the researcher's discipline" (Giorgi 1994: 208). This may entail the use of what Van Maanen (in Giorgi 1994: 210) refers to as "first-order concepts" (the research participant's language) and "second-order concepts" (the researcher's discourse).

During the data analysis the researcher transforms the natural meaning unit – the spontaneous description expressed in the everyday language of the subject - into the technical language of the relevant field. Polkinghorne points out that this is not merely a case of rendering the description in more formal or abstract terms, because the focus is always on the experience: "The transformation 'goes through' the everyday linguistic

expressions to the reality they describe, and then redescribes this reflective reality in the language appropriate to a phenomenologically based psychology" (1989: 55). Transformation involves two thought processes – reflection and imaginative variation – to be discussed further on. An adequate transformation will not be idiosyncratic to the researcher, but will allow a reader to work backward from the transformed version to the original naïve version (Polkinghorne 1989: 56).

Although description is used also in other methodologies – including the natural sciences – what is distinctive about it in phenomenology is that it needs to be undertaken with a particular attitude on the part of the researcher, that of reduction.

Reduction

The attitude of reduction (as opposed to the 'natural attitude') is a defining characteristic of phenomenology. It is about approaching the data with an attitude of openness, which allows one to suspend or bracket existing knowledge about the phenomenon as far as is possible, so that the researcher can look afresh, and gain new intuitions about the phenomenon being researched (Giorgi 1994: 212). All aspects or horizons of perception are given equal consideration by the researcher, who in a process of horizontalization, deliberately avoids giving precedence to a particular horizon or aspect (Moustakas 1994: 53). Horizontalization is possible because the researcher suspends or disengages prior knowledge in the 'natural attitude', and is thus able to see as is for the first time. This disengaging to achieve a temporary state of disinterestedness is itself value-laden – for the researcher is hoping to know what is really happening (as opposed to interpreting or speculating about what is happening), and the disengaging is thus deliberate and intentional (Giorgi 1994: 205). The researcher must also guard against premature closure and consider numerous possible horizons before breaking off or reaching closure. It is impossible to consider all horizons as a new horizon arises as each previous one recedes (Moustakas 1994: 95).

In view of the criticism directed at this phenomenological reduction, it is important to note that the reduction may be limited to a phase of the research, and certainly does not imply naively that the researcher can 'forget' or undo his or her existing knowledge. Farber talks instead of the researcher trying to "lose the world by the method of the 'reduction', in order to find it later in the field of universal self-consciousness" (1966: 62).

The search for essences

Essences are just "the most invariant meaning for a context" (Giorgi 1994: 214) or what Van Kaam refers to as 'the necessary and sufficient constituents of experience" (1969: 334). It is necessary to go beyond the actualized (the 'factual' facts) and include also the possible facts because experience and ideation are equated as modes of consciousness. As previously pointed out, experience refers to the presence of a material, empirical object to consciousness, while ideation refers to "the presence to consciousness of objects he [Husserl] calls ideas or essences" (Giorgi 1994: 217). This various considering of ideas as well as experience is known as 'imaginative variation'. As those imagined possibilities that do not withstand criticism must be discarded, "it is possible to arrive at a (psychological) statement which accurately expresses the subject's intended meaning" (my brackets Stones 1988:154). It is the process through which we arrive at meaning.

To use imaginative variation to achieve this goal is not to avoid the actual, but rather to be sure that possibilities that have not been actualized will contribute equally to the invariant. When facts are considered they are taken up as examples - that is, as possibilities that are actualized, but which could have been actualized in other ways.
(Giorgi 1994:217)

Giorgi makes a useful comparison between imaginative variation in phenomenology and what he calls using a "negative eventful incident" familiar in other methodologies, that is to think of something (e.g. what is normal) in terms of its 'negative' (what is deviant) (Giorgi 1994: 215).

These three phases - description, reduction and the search for essences - are thus not unique to phenomenology but occur in various guises and as different processes in other qualitative methodologies. Phenomenology makes features of them - makes them explicit and prominent, and it is in this that the "power and richness" of phenomenology is to be found (Giorgi 1994: 216).

3.4.2 The phenomenological method

Bearing in mind Polkinghorne's injunction not to treat a phenomenological method as an algorithm, in describing how this study is to proceed, I will use the method set out by Giorgi (1979) used originally in his study on learning among ordinary people in everyday contexts. The five steps also correspond very closely with the steps Stones (1988) uses. However, what remains most important is that it offers a comprehensive and clear guideline, covering the three tasks of the phenomenologist described above: description, reduction and the search for essences. Giorgi's (1979:83) five steps are: -

> Read the entire description to get a sense of the whole.
> Reread the description carefully and delineate all transitions in meaning. These delineated sections are the 'natural meaning units' or constituents.
> Eliminate redundancies and clarify or elaborate the meaning of units by relating them to each other and to the sense of the whole. At this stage NMU can be grouped into themes.
> Reflect on the given units (still expressed in the subject's language) to come up with the essence of the phenomenon for the subject. Each unit will need to be systematically interrogated for what it reveals about the phenomenon for that subject. It must then be transformed to the language of the discipline.
> Synthesise and integrate these insights into a consistent description of the structure of the phenomenon.

Before providing background on how the descriptions were obtained in this study – in other words what happened before the first step – some clarification of Giorgi's reference to natural meaning units (NMUs) is required. (Other concepts such as essence, transformation and synthesis have been adequately covered in preceding discussions.)

A natural meaning unit is quite simply "a statement made by (the subject) which is self-definable and self-delimiting in the expression of a single, recognizable aspect of (the subject's) experience" (Cloonan in Stones 1988: 153). It is determined by a change in nuance in meaning as indicated by the subject's phraseology. It is important to retain the subject's own language at this stage to allow the data to "speak for itself" (Stones 1988:153). One should also guard against developing a fragmented or decontextualised collection of units – the NMU must always be seen in terms of each other and the protocol as a whole (Stones 1988: 153).

Polkinghorne in his discussion of studies undertaken by Collaizzi, Van Kaam and Giorgi points out that although the studies differ they are similar in that they cover three common steps: a) the division of the original protocols into units; b) the transformation of the units by the researcher into psychological and phenomenological concepts; and c) the synthesis into an essential description of the experience (1989: 55). These three things will occur in my study too.

3.4.3 Methodological start-up procedure

A class of 16 final year industrial engineering students was approached and asked to complete a sifting questionnaire. The students in this class were all in their final (fourth) academic semester, most having completed the prescribed two semesters of experiential learning in industry. This experiential learning involves working with an industry mentor on a real project – usually with other employees as part of a team – which is logged and written up in the form of a long report for evaluation. The industry mentor also submits a report on the student's overall performance, but only the student report (graded by the lecturer) is used in determining the mark for this course.

These students thus broadly meet the selection criteria described by Stones (1988: 150):

they "have had experiences relating to the phenomenon to be researched" as they were all in their final semester and most had also spent a year in industry learning;

they are all sufficiently "verbally fluent and able to communicate their feelings, thoughts and perceptions …" (Stones 1988: 150);
they are all fluent speakers of English although only two of the 16 are native English speakers. The environment in which their academic and experiential learning was taking place was English, and the chances that nuances in meaning would be lost because of the difference in languages was relatively small;
they were all willing to participate and would not be required to sacrifice personal time.
Stones' recommendation that subjects should "preferably be naïve with respect to (psychological) theory" was likely to be attained (1988: 150). Their commitment to the research came from the fact that they were full-time students, trying to 'learn' (that is, daily practising what I was investigating), and their naivity from that fact that most of them had likely never reflected on what they were doing and how they were doing it.

It was difficult to word the questions in a manner that would encourage them to reflect on their experience, and then record it for me. The questions needed to direct the subjects towards their own experiences of the phenomenon, not to elicit some 'worldly depiction' of a 'neutral reality'. I needed to understand their experience, and was particularly interested in whether their perceptions of their learning experiences differ from the range of familiar theoretical descriptions of what should be occurring when a student learns to think and write in a professional context. The literature review (chapter two) in which the current knowledge in the "natural attitude' was surveyed, served also as a base for me to reflect on my presuppositions and biases. Coliazzi calls this self-reflection the "individual phenomenological reflection" (in Polkinghorne 1989: 46). The data of this individual phenomenological reflection serves as an aid in creating awareness of presuppositions that need to be bracketed.

I could not prompt the students without transgressing the phenomenological imperative to bracket my natural attitude knowledge of writing and discourse acquisition. Yet, because they had probably never reflected on their own experiences of writing and discourse acquisition, I was intensely aware that my unprompted questions may give them too little to

go on – that they may miss the point of my unprompted questions. It was in fact, precisely in their naivity that the challenge and potential of this study lay.

Although the questionnaire was designed with Van den Berg's four questions in mind, not all questions can be directly related to the four relationships he mentions: self –objects, self-body, self-others and self-time (1972: 31). The questionnaire served as a sifting instrument, and as such it needed to point out those students who could well reflect on their experience and express that reflection.

The first version of the questionnaire containing seven questions was piloted with two students in the Faculty of Electrical Engineering. They completed it at home in their own time and returned it to me. They gave short, even cursory responses, which left me with the impression that they may be giving answers that they thought were 'proper'. There was also little reference to writing. The brevity of their answers disappointed me – I needed full rich answers, which described specific incidents in their experience. I felt the brevity was a reflection partly of the wording of my questions, but also of their disinclination to spend personal time completing a questionnaire for some unknown researcher.

Consequently, both the wording of the questions and the request for personal time to complete the questionnaire was changed. The questions and preamble were revised to emphasise detailed descriptions of specific incidents. Four questions relating to their writing development were added (questions 8 -11). The addition of these four questions furthered the likelihood of 'neglect' if students were to be asked to complete it their own time: I would have to find a lecturer who would allow me class time to run the questionnaire (I don't teach a final year course myself). I would also need to get the students to appreciate – and comply with – my request for details of specific instances.

The lecturers in this programme are aware of industry's concern about students' and graduates' writing and thinking competencies, and were interested in my proposed research. One of the lecturers was willing to make an hour and a half slot available to me to run the questionnaire. I began the session by playing a round of twenty questions with the group as an

ice-breaker (I had ever only tutored one student in this group during his first semester), and as a means of illustrating how frustrating and misleading the answers to yes-no questions can be. (This is the type these students probably prefer to answer because it requires less thinking and writing on their part.)

Questions one and two probed what changes they had undergone, what learning they had experienced. I wanted them to describe what learning they had experienced and deliberately used the word change rather than learn, for in my experience students have a fairly narrow understanding of 'learn', and take it to mean the act of memorising.

Questions three and four asked about other people and times and places that stood out in their experience of learning. In these questions I was hoping they would describe their awareness of themselves in the context in which they learnt, their *Lebenswelt*. In these two questions I cover two of the four aspects Van den Berg refers to in describing the relationship of the self and the world (1972: 31). The other two, namely body and objects, are covered indirectly by question five which relates to perception of self. It would allow students to refer to their relationship with objects (for example, a computer) and also their bodies as part of themselves.

Question six again asks about their relationships with others, that is, their understanding of others' perceptions of themselves. Questions seven and eight allow for further exploration of their understanding of their experience in terms of time - seven into the future, and eight looking at the past three years.

In question nine, students are asked to elaborate on their expectations. This question probes their experience of the relationship between self and objects (texts they are asked to produce) as well as the relationship between self and time. Question eleven, in which they are asked about the role of imitation, also covers two relationships, that of self and objects, and that of self and others. It allows them to describe what and whom they have imitated.

Question ten invites them to comment on the usefulness or not of their first semester communication course in the context of the whole programme (experiential learning semesters included). This course is designed to meet the professional communication skills they will need in industry, and includes explicit teaching of thinking, writing and speaking.

The students completed the questionnaires with great intensity – some students actually staying into the lunch hour to complete it. Although students occasionally left a question or two unanswered, the questionnaire generally elicited full and detailed responses. Many students commented when they handed it in that it had been difficult to answer, or that they had never thought about these things before. It certainly allowed them to reflect on and describe their experiences of learning to think and write.

The only criterion for selection was the richness of the written response. As the interviews were to follow on the questionnaire, it was necessary to identify those students who had given detailed, in-depth written answers. The responses were carefully read to find participants whose answers promised rich interviews. Six students were selected from the sixteen and invited to elaborate further in an interview. The gender, race and language backgrounds of the six covered the range of gender, race and language in the class as a whole, and it was thus not necessary to make any substitutions to obtain a variety of backgrounds. (Of the six, four are women. Five of the six are black – four of them African.) In selecting subjects for a phenomenological study, the purpose is to "generate a full range of variation in the set of descriptions to be used in analysing a phenomena" and not to meet statistical requirements relating to distribution or representation (Polkinghorne 1989: 48).

This unique purpose of phenomenology is a significant point of difference with other methodologies where the ultimate goal is to make some generalisation in order to predict or control. Phenomenology seeks understanding for its own sake. This does not imply that it is any less useful than other forms of research – Polkinghorne refers to "productive phenomenological research" which, in establishing a deeper understanding of the experience for the participant, is useful in three ways: we become more appreciative and sensitive to the experiences of those involved, we can expand, deepen and even correct the theories derived

from other methodologies, and actions and policy (in this case teaching practice and curriculum) can become more responsive to the phenomenon as it occurs in experience (1989: 58).

Interview questions were prepared using the questionnaire responses. Because in a phenomenological study it is considered neither desirable nor possible to prepare a set of identical questions to be asked in the same sequence during the interview, an individual interview schedule was prepared for each of the five students. A phenomenological interview is regarded as a conversation (Mishler 1986: 13) in which the participant engages with the researcher to share his or her experience. It must be noted however, that although the researcher individualises the interview, he or she must remain focused on the theme, pursuing the research question.

The interviews were conducted after a careful reading of Mishler (1986) and Kvale (1996) and the preparation of a guide or schedule of questions probing what the participants had said in their questionnaires. Although interview schedules were prepared for each participant, the interview was sufficiently open (but focused) to be led by what the participant said. Throughout the interviews the participants were asked 'what?' and not 'why?' as that would be a request to interpret his or her own experience. The interviews were tape - recorded and transcribed, and form the raw data for this study. That data was not of objects and actions in the 'real world', but of the experience as it presented itself to the subject.

In preparing and conducting the interviews, I was aware all the time of two things. First, that in an interview the participants do more than answer questions – they would be formulating their own conceptions of their lived world (Kvale 1996: 11) and it was these formulations - spontaneous and naïve – that would be my raw data. But second, that this formulation occurs in my presence and in response to my questions. In the interview I become part of their lived-world. Fleming points out that the interview, or verbal account, is always given in a social setting which it constitutes, the purpose is to co-ordinate social action and such action is moral (1986: 547). However, I do not agree with Fleming "that the accounts given in one setting, context or situation cannot legitimately be used to constitute the reality of another

setting" (1986: 561). There certainly is a change in awareness that results from the very act of reflection – the self is relocated to a point of observation that is removed from the experience (Polkinghorne 1989: 46) – but this does not undermine the legitimacy of the participant's account of his or her pre-reflective reality. It does highlight my responsibility as researcher working with others' descriptions of their experience, and as interviewer conducting an interview of which the transcription forms the raw data for a phenomenological study.

Chapter Four

Structural Descriptions

One of the primary ways - probably <u>the</u> primary way – human beings make sense of their experience is by casting it in narrative form (Gee in Mishler 1986:67).

Narrative is undoubtedly a primary and powerful way of understanding experience. This study started with the interviews in which the participants narrated their experiences. I felt satisfied with the interviews, believing that narrative is particularly appropriate also for understanding the lives and experiences of others.

In transcribing the interviews I became acutely aware of how limiting a medium written protocols are: I could record only what writing convention allows of the interaction in the interviews. I tried to retain as much of the speaker's meaning by including what convention allows - the hesitation and the laughter, the doubt and the conviction. But as Mishler points out, the interview is a speech event, so there is always the "problem of inadequate representation" (1986: 36) in transcription. Despite the inadequacy of punctuation as a notation system for the interaction of an interview, ultimately I was satisfied with the protocols. I accepted, even expected, the sense of limitation and loss that occurred in the transcription, for the protocols are by definition a record of a conversation, and not the conversation itself.

What I had not expected was my sense of dissatisfaction and difficulty with my first attempt at delineating and explicating the natural meaning units (NMUs). I had never doubted the usefulness of this procedure, or the power and clarity with which it allows the researcher to move from the experience of the participant to the essence of the phenomenon. Giorgi's (1985: 54-55) illustration of how meaning units function particularly appealed to me. It seemed all so apparent. But as a reader of others' work, I had not appreciated the complexity and responsibility involved. NMUs were clear and powerful precisely because they were the result of a complex task responsibly performed. I was to discover why Giorgi describes using disciplinary language to express the

participant's meaning as "one of the most difficult tasks in qualitative research" (1994: 208).

This realization came only once I had completed my first set of NMUs. It amounted to little more than a long exercise in reported speech. I had retained the participant's words as far as possible because I was uncomfortable in changing the words of her naïve description. When I reflected on what I had produced the reasons for my sense of dissatisfaction became apparent: The responsibility was greater than I had anticipated. I was reluctant to accept my responsibility as a researcher for delineating NMUs and transforming the language. To move from what the participants had said to what they meant, I had to make what Colaizzi referred to as "a precarious leap" (1978: 59).

I was scared both of silencing and speaking for the participant because I took very seriously Husserl's injunction to return "to the things themselves". This was no simple task. Having chosen an approach that required I let the data speak for themselves, I soon discovered they were not going to speak <u>on their own.</u> Once I realized this, I could accept the responsibility it implied for me as a researcher and begin again.

This time it was no mere exercise in reported speech. I experienced the challenge of the process as Schleidt captures it: "A simply prodigious amount of time, spent in presuppositionless observation, is necessary in order to be able …to lift the gestalt from its background …"(Schleidt in Moustakas 1994: 89).

Going back to the literature in search of clarity amid my difficulty, I found a reminder I had previously overlooked:

> In other words, it is the meaning-for-the-participant insofar as it is relevant to and revelatory of the research question that matters…Each time, it is the duty of the researcher to express the 'insofar' aspect in disciplinary terms.
> (Giorgi 1994: 208-209)

Those lines were reassuring. Meaning as used in the explication of NMUs is qualified: first by "for-the-participant", and second by "insofar it is relevant to and revelatory of the research question". It's not about the meaning. I was also reassured by Giorgi's use of the word "duty" – my sense of responsibility was not unwarranted!

Faced with long protocols from which I had to delineate the units of meaning as they existed for the participants, I worked with great concern for the participants' meanings - now recorded in mere words. In delineating the NMUs, I was involved in "the final stage of listening to hear the meaning of what is said" (Rubin and Rubin 1995: 226). Procedures that in the literature were neatly described in three words - "lifting the gestalt" (Moustakas 1994: 89), "removing repetitive statements" (Moustakas 1994: 34) - were difficult, and always left me feeling uncertain. I struggled despite the clarity and simplicity with which the operations were described: Reduce overlapping expressions to "precisely descriptive terms" (Van Kaam 1969: 326).

Removing repetitive statements required that, having set aside prejudgements, I judge. I knew that beginning without presuppositions is not the same as beginning in ignorance (Farber 1966: 48). Any biased omission I made could silence the participant. Any prejudiced inclusion I made could be mere ventriloquy of my voice through the participant. I had to resolve the tension I experienced in knowing that while their meanings were sometimes dependent on the very words I was transforming, I needed to be faithful to their meanings.

It was difficult to decide even on the omission of repeated words, for sometimes, in the repetition lay the meaning-for-the-participant. So, despite my general commitment to conciseness, I have sometimes retained obvious repetition because I judged it significant to the meaning-for-the- participant (**L5**, **T11**). I was aware also of the danger of sanitizing what the participant had said. An awareness that was stronger to me than "suppressing or glossing over the richness of meaning-for-the-participant" in using disciplinary terms (Giorgi 1994: 209). I proceeded with great caution: delineating the NMUs, removing repetition and quirky habit words, and transforming participants' words

to the "precisely descriptive terms" necessary. The tone and tempo of the interview, both of which had been used in establishing the meaning-for-the-participant, had already been lost in transcription. I tried not to lose more.

But at times the naïve descriptions had a power that I felt was being lost, "suppressed or glossed over" in the transformation process. Van Kaam refers to naïve descriptions as "crude, spontaneous or pre-scientific explications made by untrained subjects" (1969: 325), a reference that evokes the power of the participants' descriptions. I think it is inevitable that in transforming them to disciplinary language some of the richness is lost. I have included the participants' original words often in my descriptions in an attempt to contain the loss and retain the uniqueness. Nevertheless, all six are written up as descriptions of structures in "my words" – in the words of a researcher using the discourse of education. The way in which the participants had shared their unique experiences was in other, different words – words which I was having to transform. The theory of academic discourse, now so familiar, had come to back haunt me: the everyday words and narrative ways of making sense of experience, though powerful, even primary as Gee argues, are not accepted in academia.

Narrative must be transformed, and NMUs are an essential part of the process. They make it possible to move from naïve description to structural description. In contending with tensions involved, I developed a great appreciation "for the duty of the researcher to express the meaning-for-the-participant insofar as it is relevant and revelatory to the research question" (Giorgi 1994:208-209).

To illustrate the complexity of expressing the meaning-for-the-participant, I'll refer to a unit from Thandi's protocol. Thandi uses the word "fluiting" (**T15**) in her description. It is a word borrowed from Afrikaans, and is somehow more course even than "wolf whistling". She adds the suffix 'ing,' and it functions as a regular English participle. Whether she uses fluiting or whistling, we would know what the workers did. What they did is not affected by her choice of words: The meaning-for-the-participant is. As a phenomenologist I am not interested in understanding what the workers did (whistled): I

want to understand what she felt ('fluited' at). Her experience was of fluiting, not whistling, and I feel my explication is far less powerful than her description. There is an irresolvable tension in performing the transformation that comes from the fact that in phenomenology "description is the linguistic articulation of the intentional objects of experience" (Giorgi 1994: 211). But the NMUs are linguist articulation using second-order concepts (Van Maanen in Giorgi 1994: 210), for in them the meaning is "re-expressed in the language of the researcher's discipline" (Giorgi 1994: 208).

Van Kaam's reference to reducing the concrete, vague or overlapping expressions to "precisely descriptive terms" (1969: 326) belies the complexity of the procedure. And so, I was not prepared for the difficulty this reduction posed in practice. I present the NMUs and structural descriptions without any attempt to hide the difficulty I experienced in dealing with methodological issues that in the literature had seemed simple. I accept that it is unavoidable in making the transformation from naïve description to NMUs and structural descriptions that first-order richness is lost as words are changed, but also that it is possible - albeit difficult - for the researcher to retain the meaning-for-the-participant.

Once I understood the tension inherent in the procedure and accepted my responsibility as researcher, I moved beyond the mode of reported speech. This was a significant shift which enabled me to proceed, although I never felt entirely at ease doing it. Much as it would have alleviated my unease, I knew that seeking confirmation from the participants for my NMU and structural descriptions (as I had done for the transcriptions) was inappropriate, even impossible (Giorgi 1994: 209). I resigned myself to the sense of unease and remained always aware of the burden of responsibility that goes with letting the data speak for themselves.

In describing their experiences and perceptions, all participants at times used 'you' as a third person, to mean 'one', some unidentified person, but not 'you, the researcher'. At times they would refer to both 'you' and 'I' in the same sentence when talking about themselves. I have taken such references to 'you' to mean 'I' for clearly they were talking about themselves (cf. **C23, L6, A6, Z7, P33, T7**).

4.1 Brief biographical sketch of Colin

Colin comes from an upper middle class background: his father is an academic and he attended a leading high school. As he was unsure of what he wanted to do when he left school, he went to work - first as an assistant fitter for a year and then as a fork truck driver in a large factory. During this time he studied Maths, Economics and Accountancy part-time at university, before finally deciding to do industrial engineering. He has completed two semesters of experiential learning.

4.1.1 Description of the structure Colin acquiring the discourse of engineering.

Colin's learning has generally come easily. He describes his acquisition of engineering concepts and terminology as "pick(ing) it up along the way"(**C5**) without great effort. He seems only to have become aware of his acquisition once it was accomplished. One day after answering a question in class, he realised that he had been "rapping off" and wondered to himself "geez- where did I get all that from?" (**C65**).

Informal and non-formal situations have played a large role in his discourse acquisition. He describes how he was impressed by the manner his mentor greeted factory workers, and he made a conscious attempt to do the same. One of his first experiences of learning about presentations occurred in Scouts when his troop leader pointed out that he 'uhms' a lot, something which he "didn't realise" (**C37**) he had been doing. He has since become very aware that he "need(s) to do less uhming and ahing"(**C8**) when he talks, as he feels it is essential to "com(ing) across as being definite and concise" – an indication to other people that he "know(s) what he is talking about" (**C7**).

Although much of Colin's learning came easily and his awareness occurred afterwards, when he realised what he had accomplished, he also consciously and calculatingly set out to observe, imitate, and appropriate professional behaviour. He says that he observed successful people "very closely" to establish their good qualities, and he would then "try

to take those" (**C45**). He admired his industry mentor for his confidence and knowledge and recalls thinking "that's the way I also want to be" (**C18**). He would also reflect on his experiences while in industry and attempt to understand or "crack" (**C46**) what had happened in a particular situation to draw from it what he could use later.

Confidence played a great part in making learning a fairly easy experience for him. "It's that whole confidence scenario" (**C42**) rather than knowledge which matters to him, and he believes that knowledge does come into mastery to a certain extent, it is possible to "bull shit" one's way through things: "It works if you're pretty good at it" (**C9**). Even when his mentor first sent him to East London to solve a problem in the plant there, he felt confident rather than daunted: " I felt good that my company had the confidence in me" (**C23**). There were times on that trip when he doubted his own ability, when he was "hit by this unconfident feeling" (**C26**). This doubt was not pervasive or enduring, and he accommodated it when he realised that it was a "natural" part of learning. He is unable to account for his confidence other than speculate that, "er, it must have something to do with my upbringing…" (**C28**).

Colin is very aware of his status as a student and, based on his professional performance in industry, simultaneously also of his status as an aspirant engineer. He can recall feeling awed and intimidated when he was escorted into the boardroom to discuss the problem he had been sent to solve in East London, "geez, here's me, a student" (**C22**). He gained confidence from his performance and from knowing that he could get help from others if he needed it. His overall impression of that situation was that "I was actually, I think I was a bit more of an engineer, but I felt like a bit of both…" (**C29**). Although he was able to perform competently as an engineer, he feels that students are stigmatised because of their lack of experience and knowledge of certain things.

His dual identity (student-engineer), makes him sensitive to other peoples' perceptions of him, particularly in a professional context where he is "definitely aware …what people think about you" (**C41**). He more than once refers to ensuring that he does not appear stupid to other professionals (**C10, C25, C58**). He also frequently mentions feeling

judged for the way he uses language in professional contexts (**C12, C25, C39, C54**, **C59**), but adds that he does not himself judge people by what they write. He feels this may be a point where he differs from other engineers; " I suppose that's me as an engineer" (**C49**). Although he is very aware of how he talks in a professional situation, he is less concerned in an academic context (**C14, C59**), and when he's with friends he "couldn't care less" (**C38**). This difference in his behaviour "bothers" him and leads him to wonder why he has "that almost split personality" (**C40**), but he accepts the tension as unavoidable. He feels in fact, that he tends to "put on an act, not in a bad sort of way… just to be more accepted" (**C41**).

He is able to make himself acceptable to different people in different contexts largely by his behaviour and his use of language. He believes that language "makes your life as an engineer easier if you can almost slot into those different levels" (**C55**). When he needs to gain the cooperation of factory workers he adjusts his language so that he won't come across as "somebody who almost wants to be superior to them or above them" (**C54**). He believes that working as an assistant fitter before he began his studies has given him valuable insight into how workers think. He feels that had he gone straight into higher education, he too would "have no idea of how factory workers think" (**C51**).

When working with management he is cautious about what he writes and says, and feels that "naturally you have to really think about what you are writing" (**C10**). In terms of lecturers he is also canny about offering them what they expect. He believes that they value the writing "to an extent, but I get the feeling they are more interested in what you are saying" (**C14**).

He pays careful attention to his expression only when writing formal reports for management, and he is then motivated by his concern that they form a favourable impression of him as an engineer. However, he does not regard writing as a function of his engineering, but something separate, even something about which he would "go and ask one of the secretaries if I wasn't sure"(**C58**). He is vague about what he learnt about writing in the formal programme, and although he was "taught basically how to do it", he

has not appropriated the formats, the conventions, the discourse, and it all feels "you could almost say, years back now" (**C34**). It is something in his past, not an integral part of his engineering practice.

Colin is a confident student who has slipped easily into the role of engineer. What awareness there is, was not about the process of acquiring the discourse, or the nature of the discourse, but about how other people perceive him: the consequence of using the discourse.

4.2 Brief biographical sketch of Lindiwe

Lindiwe is one of four sisters – her older sister is at a technical college and her younger sister has followed her in studying industrial engineering. On campus she lives in a residence, but still enjoys going home to Mndantsane, a large township where she matriculated at a local high school. Her father is a pensioner; her mother works in a motor factory in East London. She has completed one semester of experiential learning.

4.2.1 Description of the structure Lindiwe acquiring the discourse of engineering

Lindiwe's experience of acquiring the discourse of engineering is infused with an awareness of her responsibility as an engineer. Her sense of responsibility has in many ways made her learning a difficult experience.

Her responsibility comes from her belief that she can no longer think and behave in a manner which centres around her own interests or needs, but around the task she must accomplish as an engineer. ("…as an engineer, you are not thinking about yourself you are thinking about other people. Whatever decision you make you must know that it will not most affect you, it will affect other people…" **L1**). Her sense of responsibility springs from a heightened sense of appreciation of how different her future as an engineer will be from her past as a township child.

> "I'm very lucky because some people didn't get this far. So that's what being myself means. I know what I, who I am, I know where I come from, I know what it means to be here to me, so I know to be here makes my parents proud. … I have something I can look forward to. Because I know other people, I have, I know I have the responsibilities; whatever I do I have to be responsible.
>
> (**L27**)

Her sense of responsibility is clear from an incident she describes in which she became aware of "how difficult it is to be an engineer" (**L18**). She had to deal with workers, who she knew socially, but who had come to work drunk. She had to choose between social values ("thinking about them liking me" **L18**), and professional values, "I had to stand up and say, 'This is wrong. This is what I'm here for'" (**L18**). Although she never doubted what to do, she experiences this choice and her commitment as a burden - "I had to be strong that day. …It was very, very, difficult" (**Ll8**).

She finds even saying what being an engineer means to her "a very difficult question" (**L15**). Ultimately she feels that what is "required" of her is to be "somebody who can make a difference… somebody who can improve the working, the performance and the productivity of the company" (**L15**).

Along with responsibility, she is also aware of her relationship between herself as an engineer and others. Early on she learnt from her lecturers that people often react warily to industrial engineers. She feels workers even perceive industrial engineers as "informers" (**L4**) because industrial engineers must point out to the managers what workers are doing "wrong" (**L4**). She deliberately draws on her cultural discourse to overcome this resistance from workers:

> That's why it was one of the things I used to deal with people as I, as they were black and I am black, so I knew how to deal with older people. First thing is to respect them – that's the first thing that you can use so that you can gain everything.
>
> (**L6**)

Although the knowledge that she used is drawn from her cultural background rather than the formal curriculum, it is what enabled her to cope in a professional context.

She believes that workers deserve her respect because "they are old, they are like my parents" and that "education doesn't have to make you lose respect" (**L8**). She is also particularly touched by what she perceives to be their respect for her and describes how, when she moved on from the area where she had been working, they phoned her asking, " 'Why didn't you tell us you were leaving?' So I saw that my being there made them respect me. Ja, it was very nice!" (**L13**).

Her comparison of the workers with her parents is based on her experience of the age difference between herself and them. Because of her respectful interaction with the workers, the women referred to her as "my child" (**L9**). She did not consider herself as a child, but was nonetheless aware of her youth and the cultural imperatives this placed on her interaction with the workers who were older:

> Sometimes I did feel like a child when I saw that I was the youngest… When I think about my age I say 'I am a child but look where I am, I am working'. I'm not old, but I knew what I was there – I had to be responsible so that they can show me respect.
>
> (**L10**)

Her respect for them is based on a cultural norm (age) but she elicits respect from them based on a professional norm (responsibility). She operates simultaneously in both normative systems (discourses), and although they place her at two disparate positions towards her elders, the workers, she is able to find a balance between the two inherently opposite positions. She does this by retaining her cultural notion of respect alongside her professional education: "education doesn't have to make you lose respect. When you have education you have to have respect" (**L8**).

Although she is self assured and even proud of her status as a woman: ("Uh, being myself, I think of myself as a woman and an engineer. And a very independent one! (Laughs) **L26**), she finds that other people feel a black woman engineer is "something

that is very out" (**L28**). She did however, find it more difficult working with men, and that it was easier to build a rapport with, and work with women.

Lindiwe is also aware of a duality in herself as a student and engineer, feeling like a student in class and an engineer at work "because I was doing there what I was supposed to do"(**L14**). In describing how she felt when reporting to lecturers on her industry experience for formal evaluation purposes she feels "you stand there like a student…So, they are the lecturer and you are nothing. They want you to tell them what is going on" (**L48**). Although she is quite clear that what an engineer is supposed to do is solve problems (she refers to this on a number of occasions (**L11**, **L15, L35, L38, L49**), she can't account with the same clarity for how she acquired this insight. "No, nobody taught me it's just the way it is. When I – to know that it is a problem you look to the effect that it has to the productivity" (**L35**). Regarding it not as something taught, but as "just the way it is" indicates that she has appropriated seamlessly the values of her profession.

Her experience in industry was important in her learning and she makes a distinction between learning from books and learning in practice. Of practical learning she believes, " you see it's something that is real. You experience it. You feel it. You know how it is, unlike when you are reading in a book" (**L16**). To her learning from a book is less authentic, " it's like somebody (else's) experience, so it's not your own" (**L17**), it is something she does not have to "deal" with despite her objective of getting a good mark. Nonetheless, on her lecturer's advice that she must "never sell that book" (**L32**) she admits almost sheepishly, to keeping and consulting one of her first year books. She also draws on her lecturers' accounts of their work experience as "it helps you a lot, because you know what to expect" (**L24**).

Lindiwe believes that most of the subjects "are linked" (**L32**) and she draws on one to support another. She even goes back to methods and techniques covered in her first year in preparing reports to ensure that has "specified what I used to collect the data, so that it can be accepted at the Technikon. So they can see I was doing my engineering job, not just any job. You have to put it in. What methods you used – they want that. …it's one

of the things that makes it different" (**L36**). She knows that to display her mastery to her lecturers she needs to follow set procedures.

In industry reports, she emphasizes the solution to the problem "because the company can see what you have done for them" (**L38**). Describing how she had to identify and resolve problems in industry, she says: "So I used the managers, the employees and the direct observation, and what I think about the problem. Myself, like how do I think is the problem (**L20**). Although she talks about "myself" and "how I think", she bases her judgments not on personal or intuitive grounds, but judges as a professional. She is aware also of the need to establish her identity as an engineer through her ability to share her professional understanding with her readers. "When I'm talking about my thinking, that's when I was looking at the problems. More, the way I need to express the problem, so that they can be understood as problems …" (**L34**).

Lindiwe relies heavily on external sources (textbook and logbook) to ensure that her reports comply with expectations. ("to make sure whatever I was doing, it was something I had learnt, not something that I think… so, I made sure it was the right thing" **L41**). The logbook is a particularly important source to her, it "tells" her "what the report must be and what is required" (**L22**). Although this is her primary source of guidance in report writing, she also mentions sharing her drafts with a friend in class, who gives affective support (**L51**), her industry mentor, who gives technical support (**L52**), and her lecturer who gives strategic support (**L47**). From her discussion with her lecturer she becomes aware that "the thing they rely on (most) is the way you present it", and "the passing or failing depends on the presentation" (**L45**). She judges the oral presentation of the report to be more important than the written text "Especially when it comes to the lecturers, because they don't read it, all of them" (**L46**). Her strategic awareness of lecturers' expectations also includes assignments, in which she sets out to meet task requirements, "because they always give us the assignments, 'do this' and 'do that'. So, I try all the time to be specific" (**L 42**).

She is aware of her responsibility as writer to facilitate understanding for her readers, and although she finds writing difficult, ultimately it facilitates her own learning.

> You have to write what you have done to make people understand you…. Sometimes it's hard to express all what you have seen: it's hard to say, 'I've seen this. I've done this.' …So writing helped me. So, since I've written it I understand it now – I saw, what you asked us and I know what I answered.
>
> (**L29**)

Despite what she says about writing, she prefers speaking as it allows her to respond to her interlocutor. She feels more sure of her meaning because "speaking explains everything. It explains the writing" (**L30**). Her awareness of her responsibility as an engineer, is what makes her experience writing as a difficult task, one of which she says:

> No, It's not! [easy] (Laughs) It's very not, because when you are writing the reports you have to make sure that you are using the… procedures, the techniques we learnt in work study.
>
> (**L31**)

4.3 Brief biographical sketch of Andiswa

After matriculating at a 'Coloured' school in Umtata, Andiswa was initially enrolled in the Pre-Tech course, a preparatory course for candidates admitted on their potential. During that year she heard first about Industrial Engineering and decided to register. Although she is now in her final semester, she has had to repeat two courses. She has not yet done her experiential learning.

4.3.1 Description of the structure Andiswa acquiring the discourse of engineering

Andiswa started her studies with a deficit view of herself, ascribing her placement in the Pre-Tech course to her "not knowing anything" (**A4**). In this course "they told us all the basic things", so that "when we came to the mainstream, we were like better now, … we knew where to start" (**A4**). She describes her early experiences in terms of feeling

overwhelmed and helpless, particularly as she feels that lecturers did not appreciate the extent of her sense of helplessness, of knowing nothing ("… because he didn't tell us about the keyboard, how to use this – we didn't even know how to double-click" **A38**).

This has changed, and she acquired knowledge and understanding, "as time went on"(**A1**). Of her new awareness of thinking in technical terms, she can only say, "I don't know how it happened, but I know it did happen" (**A1**). She now tries to think about classroom instruction in other situations. "If I see something outside not necessarily in class, I always think about if that was designed by me I wouldn't have done it this way, I would have done this and this" (**A3**). She goes on to refer to her kitchen cupboards as an example.

This uncertainty is off-set by a definite improvement in her confidence which occurred "somehow" (**A32**) since her first semester. She recalls with amusement how "scared" she was then: she "always sat at the front, kept quiet, didn't say anything" (**A31**). She has now become accustomed to contributing to discussions in class, particularly as a result of Mr vdM, a lecturer who expects students to participate. When she manages to voice her opinion ("when I actually say what I'm thinking" **A29**), she feels good, as if she has gained the lecturer's approval.

With other lecturers she seems less assured and confident, generally preferring to learn from fellow students because "a lecturer is more, more advanced than us, but learning from a student is better…" (**A40**). She feels that the teaching didn't meet her needs, "they have taught us but no one has actually told us what you need. I, you know the format…. but you don't know what is actually needed" (**A6**). She "learnt more from the other students" because the things that she needed to know about "they [lecturers] didn't teach"(**A7)** but took for granted. She is sure that if she had not looked at other students' reports but relied on what she had been taught, she "would have made something totally different from what the other students had written" (**A8**).

She describes how meaningless it was to try and learn from her lecturer how to use a computer, as there was no modeling or practice:

> In class you could ask the lecturer, and you won't keep that, you've forgotten. I will always forget what the lecturer did because she would say we must click there and then I'd click -okay, I'll click the B and everything goes bold. The next time I come in I don't know where she clicked. So that is why I had to ask the other students after class to do this for me and again and again until I knew you must click the B. (**A39**)

Andiswa discovered soon after arrival that her lecturers did not know what she didn't know, and this made her feel helpless. She later discovered that they also didn't know what she did know (or how she knew it). This discovery was linked to her realization that she could no longer do what she had done at school: "repeat, repeat then it goes in my head and I write the test" (**A16**). Although this approach of repetition and memorization for the test satisfied the lecturer, she wanted more - to know, to understand. "I passed, but I didn't understand anything" (**A15**) In fact, it became "a problem" when she realized that because she was "preparing for employment" she had to "understand everything" (**A17**). She now equates understanding with being able to "get it inside you, and think about it and then you can write it in your own words … not study exactly every word that you see in the textbook" (**A14**).

Andiswa believes that she learnt more and better from peers, "because when you are talking with students you are more free, so it's different. Being free, I think it helps to learn more" (**A41**). She never felt quite the same in class and says of her lectures "they were not as free" (**A43**). Her learning from peers was not incidental or peripheral, but calculated and systematic. "…and if you are thinking that what the person is saying is good, you tell yourself you are going to keep it and you are going to use it" (**A42**).

Andiswa ascribes her ability to perform professionally to her "understanding of what industrial engineering is all about. Because we know we have to produce, we have to improve"(**A25**). She has taken on a central value of industrial engineering, and even makes an us-and-them distinction between the student engineers and the workers when describing what she did in industry. They were welcomed in the factory by the workers who wanted to chat and socialize with the students, but this very act of welcoming (a

social act) violated her commitment to improving productivity (a professional act). "They didn't see a problem with that, but WE as industrial engineering students, because we want to improve the company – this is a waste of time"(**A23**). She also makes decisions about moving the workers on purely professional grounds, "it is better for her to go to that (machine) because she is slow, and the faster one will come to that one" (**B24**).

The distinction between herself as a professional and the workers, is based on the way she thinks: "No, we don't think like the workers, because the workers just want to keep their jobs and that's it" (**A22**). Andiswa believes that being analytical is characteristic of how an engineer thinks. This is something she "just picked up" (**A48**) in the course of her studies. Participating in an industry based group project helped develop her analytical skills because once team members had come up with possible solutions "we analysed everybody's idea" (**A49**). She found that she learnt more from group work with men than women because in her experience women are first introduced to technical things at the Technikon; and thus they "don't have the basics of the technical things from home" (**A36**). She describes how when she first had to draw free hand, her lecturer had assumed that she knew how to get a straight line, but that she had needed to ask the men how to do it. She felt this came instinctively to the men, but the women "don't know those things! The guys know that! They told us" (**A36**).

When doing group work she speaks Xhosa ("our language"), although she believes that learning in Xhosa is "not very helpful" (**A45**). It prevents her from "using the Technikon words" (**A45**) which she can't translate, for then "you definitely wouldn't understand what you are talking about" (**A45**). She is amused and flummoxed by the realization that nevertheless she thinks in Xhosa, translating as she talks, with the result that "sometimes, I find myself using a Xhosa name while I'm also talking in English because in my head I'm thinking in Xhosa and I'm speaking English" (**A46**).

Despite being familiar with the formal aspects of report writing "because we were taught" (**A50**), she still lacks confidence and always goes to the library to get a book "to show" (**A56**) her the format and "how to write it, so then I'll try to write my report, like

what I'm seeing" (**A56**). When she writes a group report it feels to her not like composition, but compilation: "I just think of myself as someone typing the others' work" (**A53**). She is aware also that this report lacked real collaboration, saying if they "had discussed it a lot as a group, maybe it would be a better report" (**A54**).

Andiswa seems to have come by what she knows of her field from her peers rather than from professionals. Her recourse to peers results from two separate but related perceptions: One, she feels her lecturers did not understand how to teach her because they didn't know (both what she didn't know, and how she knew what she did know), and two, a keen sense of her own inadequacy that makes her feel more comfortable with her peers because her lecturers are too advanced.

4.4 Brief biographical sketch of Zayeed

Zayeed comes from a Muslim background. He is very close to his family and lives with his parents. Being left alone for the first time last year when they went on pilgrimage for four months was a big step for him. He was strongly drawn to industrial engineering in matric, but only discovered what it was all about in the first semester. Initially he was very quiet, but he now plays a prominent role in class. He has not yet done his experiential learning.

4.4.1 Description of the structure Zayeed acquiring the discourse of engineering

Zayeed regards people, rather than texts, as his preferred way of learning, of gaining access to information, knowledge and understanding. He feels this has necessitated that he "open up" (**Z38**) because he discovered that "in my case, I think books are not really there to contact. A more person-to-person relationship is better, because he can explain, he will tell you more directly" (**Z17**).

His preference for interacting with people face-to-face is clear from the distinction he makes between understanding and writing when he says "I would like to know what the person is thinking… to understand something there and then is more beneficial than

writing down something …" (**Z22**). He also needs to engage with an informed person before he is swayed to do things in a conventional way, arguing that "unless somebody else … gives you a specific reason" (**Z1**) he will do things his way.

The person from whom he learns need not be a teacher. He finds learning in groups beneficial, as a peer "might explain it better- better to you than the lecturer might do" (**Z29**). He and a fellow classmate have nurtured a friendship which has been instrumental in his development. He draws on his friend's nine years working experience, to get an "added advantage" (**Z 32**) which compensates for his own lack of experiential learning.

Not having industrial experience has limited his learning to a theoretical dimension in which he has had to rely on textbooks and lecturers. Experience is where "everything comes from,…but I've also learnt to adapt to the theory" (**Z41**). He feels nonetheless, that he has changed, and he ascribes this change to knowledge ("because you acquire knowledge" **Z37**). Theoretical knowledge is important to him, something he can "fall back on" in practice, and even theory that he forgets, he will "know is somewhere, you have done it" (**Z7**). The importance to him of experiential learning is clear from his reference to those in a group who have not yet done their experiential learning as "lesser members" (**Z15**).

In a very real sense the theory he has done, remains somewhere outside of him; it does not become appropriated or part of his mind set. He values his past and present notes (also called "background knowledge" **Z23)** which he stores in his room to access as needed. The notes, like books, are in text form, and, like books, they don't make contact with him in the same way that people do. They don't become part of his understanding but serve as an external reference. He draws on them, going back to previous years' notes to find something that he missed when he realizes it may be a missing "building block", which would enable him to get the "complete link" (**Z24**). He sees his learning as a process of accretion of information by which he is taught the right way. The emphasis

is on information ("if you don't have enough information to do the thing it's hopeless because then it won't be complete" Z1).

Zayeed focuses on getting and having information in his writing. He refers to information as an external commodity necessary in writing - a process that begins with, and largely consists of, collecting, taking and bringing information (**Z14, Z15**). He perceives the role of writing in his learning to be one of marshalling or recording facts: "I think writing plays a big part because, I mean, you write out all the facts" (**Z20**).

In writing a report he follows the guidelines distributed in his first year to ensure he gets a good mark. He understands the guidelines essentially as a check list with which he must comply by "having an introduction, having a summary, having a conclusion, giving examples…" (**Z8**). Although he talks about writing mostly in terms of getting and sequencing information, he adds that ultimately it is about making sense to the reader, and also to himself: "…if it doesn't make no sense to you, how's it going to make sense to somebody else" (**Z21**). Despite saying this about the value of writing in creating meaning, he prefers interaction with people "because, like I said I'm more er, interpersonal"(**Z22)**.

He thrives on engaging with people, debating (**Z39**) questioning ("I'll go and ask the lecturer why. Why do you use that there?" **Z27**), challenging ("*The Matrix* was a perfect example"(**Z34**), and "…once you take the blinkers off you see the broader picture" **Z35**). This approach also makes it difficult for him just to accept, and he doesn't easily conform, but is willing to deviate from the norm, even to break the rules ("rules are meant to be broken. But not certain rules" **Z33**). He is willing also to venture and express his views on unfamiliar topics, even if it involves the risk of making a mistake, because "that's the way you learn. You have to make a mistake to learn" (**Z28**).

He is however, deeply committed to his religious values, naming the Prophet Mohammed as his "main role model" (**Z 47**). He incorporates his religious values into his professional performance as he believes "if I break those laws… I will be punished"

(**Z50**). He feels that there is a fundamental "connection" (**Z49**) between his religious values and professional values and behaviour, particularly as regards his dealings with other people which must always be based on respect for them. He does not feel constrained in any way by professional norms, and feels that he is limited only "by your personal self, outside your work" (**Z51**).

Although he is not conscious of changing the way in which he writes, he believes he does now write like an engineer, and ascribes this to the lecturers and the readings, saying "how we use the words has affected my writing" (**Z43**). He describes his development as an engineer as a gradual process, and feels there was "not one specific spark where everything has changed overnight" (**Z39**).

4.5 Brief biographical sketch of Pumeza

Pumeza grew up in the townships of Port Elizabeth, but retains strong links with her late father's family in the Transkei. She lives with her mother and brothers in a home where education is important. Her mother, who started work as a domestic worker, matriculated and qualified as a nurse when Pumeza was small. Her older brother, a teacher, is studying further. Pumeza graduates at the end of the semester. Although she is looking for a job she would like to go on with a post-graduate degree.

4.5.1 Description of the structure Pumeza acquiring the discourse of engineering

Pumeza regards change as a fundamental aspect of learning, and actively seeks ways of understanding for herself. She appropriates knowledge and internalizes change as part of her quest for meaning, an approach which facilitates her ability to do, understand, write, develop and decide on her own. Her awareness of her need to appropriate and change is an important part in her learning, and she links understanding to appropriating in various contexts.

She knows she understands what she reads when she is able to "put it in your own words" (**P1**). She makes a distinction between her own words -"language that you know" (**P2**) and "languages of mine" (**P21**) - and terminology -"scientific languages" (**P21**). When she understands the explanation of a new term and is able to use it, she "feels great" (**P31**), because it has become her own: "it's like learning a new language" (**P31**).

She describes how she was instructed to perform the same procedure in two different ways, settling finally on her own way, because "it's very good to have your own version of things, it's easier to explain, it's easier to work with your own version than it is to understand some one else's version" (**P36**). This drive to appropriate, to make what she does and uses her own, is powerfully illustrated by her experience in learning the meaning of the word *centroid*.

Her lecturer had used the term *centroid* and she asked that he explain it. After he had explained, she still felt unsure about the meaning so she "went through the books to find exactly what is the meaning" (**P24**). She needed to understand it "exactly" before she could use it. In the book it was linked to *centre of gravity* – a link that clarified the explanation, and made it easier than the one the lecturer had given. In fact, his explanation "was a big problem, because the lecturer didn't tell us that it was the *centre of gravity* that we know from high school. If the lecturer could have said *centre of gravity* even these words, I could have understood it" (**P26**). She then went back and confronted the lecturer with her discovery. His response served as a further discovery which enabled her to appreciate the significance of the first:

> 'No, *centre of gravity* is a scientific word, but you're mechanical, because we're mechanical you have to say it's a *centroid*'. It's a *centroid*. Because we're dealing with shapes and everything then when we're talking about *centre of gravity*, we're talking about something general.
>
> (**P27**)

She knew "the one they were using in class is a mechanical term"(**P24**), and she was able to make the word her own. Not only could she understand the word, but she realized that change in herself and how she conceptualized things was part of her professional

learning: "I'd heard of *centre of gravity* in high school, but I didn't know *centroid* is also the same word. So, you have to, to change" (**P25**).

Although Pumeza is driven by a need to make things meaningful to herself, she is conscious all the time of others and conventions in determining meaning. She believes that "it's really necessary to, to have a second opinion, to know what the other person is thinking…you have to make it right also for the other person reading it"(**P43**), so she tries to find meaning in terms of convention rather than to be contrary or unorthodox. She consciously seeks confirmation from her mentor (" I was showing it to my mentor all the time …'read it and then tell me what you think'" **P42**) and her lecturer ("Okay, this is what I've drafted so far. So, how do you want it to look?" **P69**, and "if I want to get better marks I have to do exactly what Mr K has been telling me" **P71**). By accepting that "sometimes there are standard procedures – when you have to do something like this, there is no other way"(**P37**) despite feeling "very good" about doing things her way, she balances the need to conform with the quest for meaningful appropriation of convention.

Pumeza experiences anxiety and nervousness in her learning because she is aware of conventions and established standards and of being judged in terms of those conventions. Her first presentation to three managers was "very scary" (**P6**) largely because she didn't know them or what to expect. Knowing what to expect and how her audience would react to her made subsequent presentations easier, so that she now feels "comfortable" and "relaxed" (**P8**). The presentation (material) itself "was not really difficult, but it's about who you are going to talk to in the relationship" that made it scary (**P6**).

Her relationship to other people is complex – she is aware of herself as being a black woman, being an engineer, and being a student. Being a student is a transient state: "Even now that I'm studying, I'm not saying I'm a, a student, because I want to be an engineer. And so I'm treating myself as an engineer" (**P15**). She was pleased with her placement in industry which enables her to disguise her student status ("the managers knew that I was a student…but in the department … I was their industrial engineer" **P16**).

Although she had more autonomy and less supervision than other students in industry, she felt "prepared for it" because "I knew that I did the course at the Technikon" (**P19**).

Being a black woman and an engineer are two enduring "sides" between which she "switches" (**P59**) in an attempt to reconcile the conflict inherent in the different norms (cultural and professional). She refers often to her "professional side" (**P52**, **P55, P56, P58**) in a manner, which implies a contrast with her cultural side – the young black woman. She is quite accepting of this duality and keeps her identity appropriate to her situation. "[In my professional capacity] I don't have to listen to him. At home, ja, but now I'm at work I have to come and give my professional side" (**P55**). In terms of her culture it is disrespectful for a young person to suggest change to an elder, a norm that makes her professional task "difficult" (**P48**), yet she never denies her dual identity. Instead, she draws on her respect for elders to support her authority over older men. She explains herself clearly because "he has to know that I have to do my work, then at the same time I'm respecting him" (**P50**).

The same professional task is "not that difficult with women" (**P54)**. She feels that generally men are inclined to question, even undermine her professional standing because she is a woman. ("Ja, they knew that I'm an industrial engineer, but they have got…but she's a woman" **P13**). Despite the complexity of her roles as young-black-woman-engineering-student she says of herself "I'm an ambitious girl" and laughs (**P57**).

Her ambition to become an engineer makes her motivated and resourceful about acquiring the discourse. When lecturers' explanations are inadequate or incomplete, she turns to a technical handbook in the library (**P29**). When her industry mentor turns out to be a young graduate in another field, she hones her explanation and writing skills so that he as a non-specialist understands her, or pretends that he's the manager (**P44, P45**). When she felt in her first year that she knew nothing, she joins a study group to draw on what others may have understood in class (**P63**). When she fails an assignment she presents the lecturer with a draft of her next assignment for comment (**P69**). When her industry mentor applies procedures differently to her lecturer, she draws from each what

is useful and develops her own version (**P39**). She engages with what ever and who ever can help her understand and make the change necessary to become an engineer.

She is aware also that there are things she does not yet know – in fact she struggles to account for how she would know when something is correct, and amused at the thought, she finally gives up (**P41**). She does not yet want to let go of the crutches ("after I did the course, like I kept all my modules **P40**) and knows she still needs practice.

It's all about what works for her – what helps her understand. What she says about her approach to group work encapsulates her whole experience: doing what is necessary to understand.

> Sometimes you see that the chapter you didn't understand clearly in class, then the other person who did get the information, then he just tell you what did happen. So, it really is a necessary experience.
>
> (**P64**)

4.6 Brief biographical sketch of Thandi

Thandi was forced by her mother, a teacher, to registered for B. Sc. Computer Science, and hated it. After failing for two years she persuaded her mother to allow her to register for engineering as she had always wanted to do. Despite her mother's reluctance and doubt, she always knew she would succeed. Motivated by wanting to achieve more than her mother, who has a B.Com., she plans to go on with a masters degree. She has completed one semester of experiential learning.

4.6.1 Description of the structureThandi acquiring the discourse of engineering

Thandi has developed a meta-awareness of her learning and uses this in varied learning contexts to enhance her learning. While she is also aware of other people's perceptions of her as an engineering student, she is not easily swayed by them, and remains true to her own understanding of being an engineer. Her approach to learning is in many ways unpretentious and pragmatic.

Thandi's mother was skeptical about her engineering studies ("Haai! You think you can do engineering! **T1**) after she had failed Computer Studies for the second year, but she badly wanted to do it and was determined to succeed. She is aware of, but resists others' perceptions or expectations that she will change because of her studies. Her family in the Transkei have changed their view of her because of her education, but she feels unchanged towards her family "you are just like them. There is nothing you have changed, nothing, absolutely nothing. …you're coming from the Technikon. That's all there is" (**T6**). She feels ambivalent about the reverence they have for her: "I don't want this thing, like I want to be treated the way I was before. But sometimes you think, 'Oh, they are giving you wings!'" (**T7**).

She is aware also of others' general expectations that as an engineering student she must dress like a tomboy, speak in a pretentious way, or be able to fix anything. Of these expectations she says "I won't change – even if I go to a working place. I'm still going to be like this" (**T10**). She believes firmly that her identity as an engineer is unrelated to her physical appearance "…it's only on the inside of you, only in the mind, because to do engineering they're all coming from the mind. You don't have to look like one, or talk like, yeah, it's only in the mind" (**T11**). Furthermore, she feels that because she wants to be an engineer in future, she "might as well start practicing now" (**T14**). Her understanding of this future engineer is someone who is "not different from other people" but must be able to innovate and make improvements (**T13**).

Although she didn't know what to expect, her experience in industry gave her a realistic taste of what work would be like. Her first day was daunting as the workers "were fluiting[23] and doing all that" because "they're not used to females in the workplace" (**T14**). The next day she performed her tasks, despite her anxiety, and was able to overcome her anxiety and fear, saying "I think I learnt that you have to be strong, you have to like take everything as it comes" (**T19**).

Her ability to take things as they come is complimented by a realistic and critical appraisal of her own limitations. She describes how amazed she was on seeing the work of three white students when the first assignments were due:

> …when we went to submit our assignments I said "Hau! My god! Heh! What do they think they are doing – doing a thesis!' And, I didn't even know you can buy these [files] - just from the bookshop. I dunno why, I, I thought that was something from a company you know.
>
> (**T35**).

At first she accounted for the quality of their work by assuming they had not produced it themselves: "like the way they wrote it, I was sure they were helped – maybe by their fathers" (**T35**). She soon realised that the difference should be ascribed rather to their different school backgrounds - at her school she had never been given assignments to do. Her school had also not prepared her for the workload, and time management was something "which we didn't know – I think that's our problem, like at our schools, like the way they teach us" (**B37**). Although she was aware of her shortcomings in her first year, even saying she had "no clue" (**T22**) how to do an assignment, she does not regard herself as deficient but ascribes her position to her school - an external factor.

Her first year was different from school in many ways – she even felt that she may have been " afraid of the lecturers" (**T34**), but she came to realize that she needed to interact with the lecturer in class ("you have to ask the lecturer questions, which means there is something you are understanding … and with it you are learning" **T38**), and to consult him on her assignments (we even go to the lecturer and ask …what does he actually

[23] Wolf whistling

need, because he's the one who wants the work done" **T33**). She took responsibility for her own development and describes it in terms of what action she took to overcome her shortcomings.

Her change in approach to writing over the three years brought with it both empowerment and renewed sense of her inability. The clear distinction she makes between the learning outcomes that result from writing assignments, exams and reports (**T54, T58, T59, T60**) indicates a meta-awareness of her learning. Her distinction hinges on two things: the source of her knowledge and the nature of the task. In an assignment she regards the source of knowledge as external, "just information from someone else" (**T59**), and she acts merely as a conduit. In a report it is internal, "from something you saw, from something you were doing, and which you were in at the time" (**T59**).

She perceives the nature of the tasks to differ as well– the industry report is authentic, and unlike an assignment "it's not a question, it's nothing like, 'you have to do this'. (**T50**). This difference is significant because she regards an assignment as something she does "just because you have to get marks, not for learning something out of it"(**T46**). She admits quite bluntly that she learns nothing from an assignment (**T47**), and that when she has to also give an accompanying oral presentation she will "just memorize something that's going to make sense to him" (**T48**). She was not in search of meaning or understanding, but information. Because she was not aware of task requirement ("you won't understand that… You don't mind about what he wanted you to do about tensile testing" **T25**) she matched words in book titles with words in the assignment topics. She relied on others to tell her where to find books with apt titles, obtained the book, and would then

> take it straight from the book, write it down as it is. You don't read it, you don't like check if it's really what is wanted, you just know that it is tensile testing. It's like photocopying! (Laughs)
>
> (**T27**).

Once she realized this approach to writing had only short term strategic advantages ("you can have marks, but you actually find out that you don't know what actually was happening" **T66**), she abandoned it ("we don't go like we did before, …asking 'where did you get the information?'"**T32**) and tried to work in a more meaningful way.

Despite this abandonment, she admits to still feeling unable to write. She is familiar with what a report must have because she has been told, but she feels that "you don't know what is actually – what is actually needed (**T64**). If she must tell "the real truth" it is that when she has to write an introduction "you go straight to the textbook, or you will ask someone 'did you write the introduction?'" (**T65**). In this situation she falls back on copying, fully aware that it is a compromise.

Although she is well aware of the benefits of writing "I think writing, like it makes you think like even more, about what you are doing as you write, as you write some ideas will come" (**T61**), she is compelled to revert to strategic behaviour because "no one has told us what is needed actually" (**T64**). Similarly, she feels the feedback she gets from lecturers on her assignments is inadequate. Although she relies on such feedback to know if her writing is meaningful, there is little written indication and no discussion with the lecturer, leaving her feeling "you don't know where you went wrong" (**T63**).

Where lecturers do not give her adequate guidance in class, she draws effectively on the expertise of her peers. She describes how she learnt a foundational skill (using a T-square for drawing a straight line) from one of her peers. Preferring to use the lighter set-square, her initial reaction to following the advice was "why should I" (**T69**). When her drawing was finished her classmate showed her that it was not straight. Only then did she accept her advice and appreciate that she should ignore her personal preferences in performing professional tasks.

Despite her feeling of inadequacy about her writing ability, she has a significant meta-awareness of how she learns. She has come to realize that information without understanding is meaningless ("they have the information, and it makes sense now" **T32**),

and she consequently tries to "put it in my own words and even add on my own information" (**T31**). She is able to use information meaningfully and talks about now being able to "rate it" or transform it, to "make yourself understand what they are talking about" (**T57**).

She knows the difference between taking information and "speaking for yourself" (**T54**); she knows the difference between knowing it "as it is in the book" and as it is "in my mind" (**T44**). She knows also that what matters "For an engineer it's not on the outside, it's only on the inside of you, only in the mind"(**T11**). She is pragmatic and unpretentious about what she does: when she reverts to copying it is for strategic gain, it is of no value to her in acquiring the discourse of engineering.

Chapter Five

A General Description

5.1 Methodological observations

The third step in Husserl's phenomenological method is the search for invariance or essences. This is accomplished by stripping away the variables of an experience to reveal the "invariance that will render a host of variables more intelligible in the realm of meaning" (Giorgi 1994: 215).

That is what this chapter sets out to do. Having described the situated structures as experienced by the six participants, I must discard the variants, and search for invariants as I move towards a general description in which the essential structure of the phenomenon becomes clear. At the end of this chapter the findings of that search are presented as a general structural description. Husserl referred to the process by which this is achieved as the *eidetic epoche*, (Honderich 1995: 659) a term that refers to the bracketing of the specific and particular aspects of an experience to arrive at the structural or essential principles. This is a complex philosophical term for which there are more accessible alternatives: reduction, thematization and synthesis.

Polkinghorne argues that the use of reduction in this context may be "unfortunate" because it is used also in positivistic methodologies to describe the characteristics of an object's "most primitive parts" (1989: 51). I share his concern about the association of reduction with what is basic or common, and prefer thus to refer to Husserl's *eidetic epoche* as thematization for it "denotes that the search for essential structures involves identifying the constituents or themes that appear in the descriptions" (Polkinghorne 1989: 51). Synthesis is a term derived from what the researcher does at this stage –"tying together and integrating the list of transformed meaning units into a consistent and systematic general description" (Polkinghorne 1989: 56). It is not just a listing or compilation – but involves an "intuitive grasping" or "eidetic seeing" of the whole

(Polkinghorne 1989:56). This differentiates it from other inductive procedures that are empirical in nature.

Two important issues and their implication for the general description need to be noted at the outset. First, it is a phenomenon, not material reality that is being described, and second, the general description is based on what transcends the specific situated experiences of the participants, rather than what is common to, or shared by all six participants.

The first of these implies that the goal is not to "expose and explore what is truly real" (Spinelli 1989: 180). This may well be an expectation held of positivistic research but one on which a phenomenological study can not deliver, for from a phenomenological perspective the real world remains unknowable. Polkinghorne reminds us of the "critical distinction" between outside reality and the participants' awareness (1989: 44). We can only know the world through our experiences, and as these experiences are unique and not fully sharable (Spinelli 1989: 29), the goal in this chapter is not to discover what is "truly real" but to clarify the variables and invariants of the phenomenal reality through a process of thematization.

The second of these implies that what is transituational is not necessarily common. Where non-phenomenological research focuses on shared features, dismissing or diminishing the importance of unique features, phenomenology emphasizes the unique features of an experience. Herein lies the value of a phenomenological study, for by "redressing the balance" between the unique and the shared, phenomenological studies are able to "increase the adequacy of our theories" (Spinelli 1989:14). I will return to this in the final chapter.

In acknowledging the value of the unique above that of the shared, the concept of 'common' as a criterion for selecting themes from participants' experiences (and ultimately a constituent of the general description), becomes problematic (Van der Mescht 1996: 100). Why, if it is precisely the exploration of uniqueness that distinguishes

phenomenology, should it be necessary for the researcher to organize the meanings into clusters or themes in a way that "allows the emergence of themes which are common to all subjects' protocols" (Colaizzi in van der Mescht 1996: 100). Establishing what is common to six unique experiences seems a contradiction in terms. If one is able to disregard the contradiction, one can at best hope to find a commonality that is far less significant and rich than that of the six unique descriptions.

Polkinghorne's insistence on referring to the meaning units as constituents and not elements of the experience (1989: 54) supports my argument that "common to all" is not an appropriate criterion in a phenomenological study. He points out that because they "retain their identity as contextual parts of the subject's specific experience", they are constituents, not elements. He adds that "(a) n element implies a contextless discrimination and results from a reduction of a constituent" (1989: 54). It is only by loosing their "identity as contextual parts", by being reduced to contextless elements, that it would be possible to find common meanings in the six unique experiences.

Van der Mescht proposes two alternative criteria that I believe are far more appropriate than "common to all" in a phenomenological study. They are appropriate because they will no compromise the fundamental phenomenological "criterion of fidelity to the phenomenon as it is lived" (Giorgi 1979: 91). Using "common to all" may compromise this fundamental principle: It may be a Procrustean bed in which finding the common becomes more important than fidelity to the data. Van der Mescht proposes first, that a theme "resonates with what a researcher knows to be generally valid and true in terms of the phenomenon" and second, that the theme " is clearly an integrated element in the participant's *lebenswelt*, and therefore significant" (1996: 101). Both of these are acceptable in terms of the phenomenological method. For while the researcher needs to suspend or bracket presuppositions, it is neither intended (nor possible) that the researcher approaches the phenomenon in ignorance. Furthermore, it is the significance of the experience, the extent to which it is an integrated part of the experienced phenomenon that makes it worthy of inclusion in the general statement, and not whether

it occurs in each separate description. It is conceivable that what is common in all participants' experience is not essential – is not an essence - and should thus not be included in the general structure. Van der Mescht's (1996) criteria could both slip comfortably into "transituational", Polkinghorne's term for referring to aspects that are descriptive of the phenomenon in general (1989:55).

Giorgi, in his account of his study of learning in everyday activities, works with only one participant and "introduces a dependency on contingencies" which clearly removes it from the realm of universal essences, but despite this, retains its phenomenological character because it "produces descriptions that transcend the specific experiences on which they are based" (Polkinghorne 1989: 53). Here too, the criterion seems to be that it is "transituational".

"Common to all" is too narrow a concept, and if used could produce only paltry pickings. Transituational is a better criterion, for it will accommodate the richness and uniqueness of the situated descriptions.

I am not presuming to offer a stand alone, universally valid description of what it means to acquire the discourse of engineering - it must be seen as a description drawn from the six situated descriptions. Nor does my general description claim to be a definition. Ultimately it may appear in the summarised form and general language typical of a definition, but it remains "a **description** (my emphasis) of the essential features" of what it means for someone to acquire the discourse of engineering (Polkinghorne 1989: 50). In this chapter I progress from offering a description of what it means for Colin or Thandi, to what it means for **someone** to acquire the discourse of engineering, Therein lies its generality.

The means of progressing from the situated to the general is described by Giorgi (1979) as dialectical, for it involves varying or modifying the typification (situated experience) "until it is comprehensive enough to be called a structure (1979: 91). It is not achieved in

a single sweep, but requires that one "describes it and then penetrates it with a deeper description until its structure is clarified and its significance grasped" (Giorgi 1979: 91).

Using multiple participants, that is working from more than one situated description, facilitates this dialectic. It is in terms of the insignificant and the variable that the significant and the invariable are grasped. By offering greater variety it becomes more apparent what is essential and what idiosyncratic. This is not to suggest that an inductive approach in the ordinary empirical sense should be taken – such an approach would in fact require that one select experiences for the general description on the basis of them being "common to all".

This is the point in the phenomenological method where as researcher, I must speak. Coliazzi in describing this stage says that like formulating the meanings in the previous stage, it involves "that ineffable thing known as creative insight" and that in moving from the data to its meaning the researcher must make a "precarious leap" (Colaizzi 1978: 59). The data still restrains me, for in thematising and describing the general structure, I must remain faithful to the protocol data – the phenomenon as it is lived. I write not in absolute final terms, but in cautious terms. For phenomenology is not concerned with exposing the outside world in absolute final terms, but with what the participants experienced, the phenomenal reality. However I try to bracket my presuppositions, I can only ever know through my intentional consciousness, which is different to the participants' intentional consciousness. The participants' description too, is already a reflective experience rather than a straightforward experience, for in the very description they remove themselves from the straightforward experience and have to place themselves at an observation point from which they articulate their experience (Spinelli 1989: 23). Reflective experience is once removed from straightforward experience: the description is never as complete as the experience itself (Polkinghorne 1989: 46). Such is the nature of a phenomenological study – it does not offer (or seek) an explanation of the real world. I raise this as a caveat on the nature of the description that comes after the themes: What I am offering is not a definition, but a general description which is subject to the participants' and researcher's interpretation. Its purpose is not to explain what

really happens, but to obtain a better understanding of the conscious experience, of the phenomenal reality.

As such my description can only ever be **a** general description – never **the** general description. The validity of my general description lies not in its finality or universality, but in my reader's concurrence with my interpretation of the data. If I have followed the phenomenological method rigorously and remained faithful to the data, my description, while not necessarily the only possible one, will contain the "constituents that are necessary for an experience to present itself as what it is" (Polkinghorne 1989: 51). And, as Giorgi states in his defence of phenomenology, "perfect descriptions are not so much required as adequate ones" (1992: 129).

5.2 Dominant Themes

Because they are presented as thirteen separate themes, it is necessary to recall Polkinghorne's distinction between constituent and element. Themes are not elements that can be separated or isolated. The themes, drawn from the meaning units, retain their contextual nature and can never be totally separated from the context a whole, and by implication from each other. So, although I have packaged and presented them under thirteen separate headings, they are not experienced separately. In fact at times, it is difficult to separate them because of their coherence (multiple identities and adapting behaviour are particularly closely related).

The themes have been organized according to the dimensions of the *Lebenswelt*. I draw on the different but not incompatible demarcations of Van den Berg (1972) and Binswanger as elaborated by Van Deurzen –Smith (Spinelli 1989). Before describing these two demarcations, I will briefly justify my choice of *lebenswelt* dimensions as the basis for organizing the themes.

I use the dimensions of the *lebenswelt* for two reasons. First by way of analysis: they are a recognized way of gaining access to the *lebenswelt* of another person. And second by

way of structuring or organizing my findings for the reader: 14 unstructured themes may become blurred.

The dimensions provide access to the other person's awareness of their *lebenswelt*, and bring us as close as is possible to understanding the other person and his or her experience of the phenomenon. Just as it is not possible to separate the themes from each other, it is not possible to separate the dimensions from each other. They exist as a coherent whole for the person experiencing them. But for a researcher and reader, they need to be unraveled from each other sufficiently to see and understand them as constituents of the *lebenswelt*, not as a knot of threads. The ambiguous and multiple possibilities for placing the themes within a particular dimension, served as evidence of how entwined and co-dependent they are. Many themes could have been placed differently – being judged is located in others/*mitwelt*, but could arguably also have gone under body/*eigenwelt*. The themes have been grouped under a particular dimension because that is where they seem to fit best – but the participants don't experience their *lebenswelt* to conform to either Van den Berg's or Binswanger's demarcations. The themes don't always fit neatly into one dimension or the other. The dimensions are however, a recognized access route and serve my purpose adequately if not perfectly.

Van den Berg identified four dimensions to the *lebenswelt*, all relating to the self: self and body, self and others, self and objects, and self and time (1972: 31).
Binswanger proposed three dimensions; *eigenwelt*, *mitwelt* and umwelt, to which Van Deurzen-Smith added a fourth; *überwelt* (Spinelli 1989: 128). *Eigenwelt* refers to the private world of self and significant others, *mitwelt* refers to the public interactions one has with others and society in general, and umwelt has to do with "the natural world with its physical biological dimension" (Van Deurzen-Smith in Spinelli 1989: 128).
Binswanger's three dimensions were extended by Van Deurzen-Smith's addition of *überwelt*, which "refers to a person's connection with the abstract and absolute aspects of living"(Van Deurzen-Smith in Spinelli 1989: 129). This allows for the inclusion of attitudes, beliefs and ideologies in the exploration of *lebenswelt*. The two demarcations of dimensions are not incompatible, but overlap and supplement each other in useful ways. I

discuss the overlap using the four dimensions of Binswanger and Van Deurzen-Smith as a base onto which I map those of Van den Berg.

Where Binswanger identifies ***eigenwelt*** (self) as a separate dimension, Van den Berg makes self the point of reference in all his dimensions. *Eigenwelt* includes what Van den Berg groups as self and body as well as self and others. Self and others is not confined to *eigenwelt*, and would be included also in *mitwelt*. Binswanger's demarcation is thus able to indicate and accommodate the difference in the nature of interaction with intimate others and others in general.

Umwelt would include Van den Berg's self and objects, but could also include aspects of self and time (time is a dimension also of our experience of space) or even self and others, in the sense that the natural world in its physical dimension is not immune to the influence of people. In a world where a physical biological aspect like the colour of one's skin affects one's *lebenswelt*, it needs to be clear that although it is a biological or bodily dimension it matters because it is also a cultural dimension. One's *lebenswelt* would change if either the colour of one's skin, or the society in which one lives were to be changed. The same can be said of gender.

Mitwelt corresponds roughly with others but, others would also accommodate *überwelt*, for ideologies, attitudes and beliefs take form in the interaction of self and others (and self and body and self and objects).

So ***überwelt***, though it does not have a corresponding category in Van Den Berg's demarcation, becomes apparent in the dimensions of self-other, self-world, self-time and even self-body for it is these that attitudes, beliefs and ideologies are lived. (Ideologies are taken as social theories with the purpose of structuring and arranging our lives – they infuse all aspects of *lebenswelt*).

I have used the four dimensions described by Spinelli (1989:128) - three demarcated by Binswanger and the addition by Van Deurzen-Smith - in naming the sections, but these

should be interpreted in the light of Van den Berg's dimensions rather than as they were initially described by Binswanger and Van Deurzen-Smith. To these I have added Van den Berg's "self and time" (1972:31) as a fifth dimension to accommodate the theme relating to time. This allows me to include the sense of both demarcations. This combined interpretation can be sanctioned as both demarcations are merely tools for investigating and understanding the *lebenswelt*. It is to be expected that the lived experiences and the themes derived from them will not fit neatly into either demarcation. Such is the nature of *lebenswelt* – it is unique, and can thus only be categorized roughly, approximately.

5.2.1 Eigenwelt

Most of what is discussed under *eigenwelt* is not directly related to the participants' experience of their physical selves, their bodies. That is to be expected, for the phenomenon under consideration, acquiring the discourse of engineering, is not primarily a physical experience. However, much of what they say about themselves is related to, or even determined by their bodily characteristics – gender, age and race.

5.2.1.1 Self concept

Self concept is a broad term which impinges on other aspects in significant ways. Much of what I have put under the next theme, "multiple identities", could also be included as self concept, but it is such a strong theme in their experience that it warrants a separate section. I will confine the description here to what the participants say of themselves. Ironically, this is often in terms of others, and echoes in *Mitwelt*. Some spoke of themselves directly and often, others said very little about their self concept. What emerges is a spectrum that ranges from deficient to superior.

Colin is generally confident and takes his confidence for granted (**C28**). In fact he refers to being confident in the imperative: "… you have to come across as very confident"(**C42**). He talks about himself as being superior in education, and manner of speaking and thinking to working class people (**C3**). Race comes into this – he feels it

necessary to "degrade" his language when talking to black people (**C53**), and he finds the lectures pitched too low for the white students (**C56**). He is confident enough to feel unfazed when he is occasionally hit by an "unconfident feeling" in challenging situations (**C26**).

Lindiwe describes herself as "very independent" (**L26**). She has a complex sense of self that contains many contradictions, and is aware of these contradictions. She defines herself both in terms of youth and responsibility (**L10**). At times she feels unsure of herself ("it's one of those things where you don't know what to expect"**L25**) and other times, quite sure of herself ("they valued my work they valued what I was doing **L12**).

Andiswa's concept of self has retained the impression of deficiency she experienced in her first year. She describes herself as "not knowing anything" (**A4**) when she arrived, as needing to be made "better" (**A4**), and as being "scared"(**A31**) in her first year and not participating in class. Her confidence in class has "improved somehow" (**A32**), but she is inherently shy in class and finds it difficult to voice her opinions (**A29**). When working on a collaborative assignment, she thought of herself "as someone typing the others' work" (**A53**) a typist, not a writer. She is more confident about her ramp *modeling* work, where she says she has to be confident (**A13**).

Zayeed characterises himself as an "interpersonal" (**Z22**) person. Although he does not use the word confident to describe himself, he is outgoing, and he thrives on interaction with others. He is willing to risk making mistakes in his learning (**Z28**), likes to confront lecturers directly to question things they say (**Z27**) and enjoys debating in class (**Z40**). While he has a non-conformist approach to social rules (**Z33**), he is deeply committed to following the laws of his Muslim belief.

Pumeza thinks of herself as "an ambitious girl" (**P57**) and has a positive self concept that enables her to act with perseverance and commitment. She has acquired her confidence from her course work (**P9**), and was "comfortable" with the unusual responsibility she

had in industry (**P19**). She is able to think for herself (**P35**) but also seeks a second opinion (**P43**).

Thandi is self assured and satisfied with herself – both with her physical image (**T8**) and inner being (**T11**). She is unpretentious and seeks to be true to herself (**T6**). She casts herself as a strong person (**T19**), but is aware also of her shortcomings (**T65**).

5.2.1.2 Multiple identities

All participants except Zayeed described themselves as experiencing an awareness of multiple identities. This was experienced as a 'student-engineer' duality, and in the case of the women, around a 'black-woman-engineer' trinity. Their perceptions of identity affect their perceptions of status, their writing and learning.

Colin is aware of his dual identity as student-engineer. He was placed in a responsible position by his company and sent to East London and Johannesburg to solve problems there, an experience which made him feel important as he saw it as a reflection of his company's confidence in his professional ability (**C23**). He recalls thinking "Geez, here's me, a student" (**C22**), and was aware of his dual status. He felt " a bit more like an engineer" (**C29**) and believes that students are stigmatized because of their lack of experience (**C30**).

Lindiwe identifies herself "as a woman and an engineer" (**L26**) and is herself comfortable with this identity. But she is also aware that men expect engineers to be men, an expectation that creates tension for her as a woman (**L28**). This tension is furthered by her being black, for people perceive that a black woman engineer is something "very out" (**L28**). She in fact uses her racial identity to her advantage: "(A)s they were black and I am black"(**L6**), she builds a rapport with the workers based on a shared cultural understanding of respect. This she "uses to gain everything" (**L6**). Her shared culture with the workers also had implications for her status because of her age. Through her awareness and separation of her multiple identities, she was able to

circumvent the submissive position expected of a young black woman dealing with men (**L10**). She is aware also of another duality in status when she presents her report on her semester in industry for evaluation by her lecturers. She sees herself both as a professional "who knows what's going on (in) Eskom", and as a student, who, in terms of the lecturers is "nothing" (**L48**).

Andiswa too, is aware of her identity as a woman. She experiences this as a disadvantage – that as a woman she lacks the technical background the men grew up with (**A35**). She consequently prefers working with men as she learns more from them (**A36**).

Zayeed is the only one not to refer to a multiplicity in his identity. He has not yet done any experiential learning, so his experience of acquiring the discourse of engineering has been only as a student.

Pumeza sees herself as being both an engineer and a young black woman. As she cannot be both simultaneously in her dealings with other people, she "switches" between her "sides" (P56, P59). She is resigned to keeping her professional life distinct from her life as a young black woman (P53). At times she is aware that " I have to be the other person" (P52), a requirement which causes her difficulty. Her dealings with workers are complex because of her cultural identity: As a younger person she is the junior, as an engineer she is the senior. (L47, P48, L49). She is quite comfortable with her status as woman engineer on campus (P60, P61), but feels that her status in industry is sometimes questioned, even by other engineers, because of her being a woman (P13).

Pumeza is also aware of her dual identity as student-engineer, and downplays her student status to herself ("I'm not saying I'm a student, because I want to be an engineer" **P15**) and in industry ("the managers knew I was a student, but in the department that I was working with, …I was their industrial engineer" (**P16**).

Thandi is aware that her dual identity as young-black-woman and engineer affects her dealings with older people (**T2**) and male workers in the factory (**T15**), but she takes it in

her stride. She also does not conform to the gender stereotypes people have of her (**T8, T9**). She is phlegmatic in her perception of her role as engineer and as student. Her differentiation affects her perception of her responsibility for learning rather than her perceived status. As a student writing an assignment, she does not learn (**T47, T55**); but as an engineer writing a report, she does (**T59**).

5.2.1.3 Development

Participants referred to development either as internal or external change. In some instances this development or change was directly ascribed to the programme.

Colin perceives change in himself which affects his life generally (for example, his car and room) as he has "just become a much more organised person" (**C1**). He believes that because of his course he has become more disciplined, which also makes him less tolerant of people (**C16**). He realised recently that his thinking had changed when answering a question in class he began "rapping off" (**C63**) - using the discourse comfortably. He surprised himself by this and wondered "geez – where did I get all that from?" (**C63**).

Lindiwe has undergone a fundamental change in her manner of thinking and interaction with people: "One thing that I learnt about thinking is that whenever you think now as an engineer, you are not thinking about yourself you are thinking about other people" (**L1**). She has also changed her approach to writing significantly from her first year when she "knew nothing" (**L39**). The project she did in S1 facilitated this change. Where her writing had consisted of locating and copying information, she now shows some task awareness (**L41, L42**) and text responsibility (**L31, L32**).

Andiswa changed from "not knowing anything" to knowing "where to start" as a result of her preparatory year (**A4**). She refers to this change as being made "better" as a result of all the basic things "they told us" (**A4**). She is now aware of other changes in herself: being aware of technical things around her (**A1**), being more confident (**A32**) and being

analytical (**A48**). She is vague about how these changes occurred, saying respectively: "I don't know how it happened, but I know it did happen" (**A1**), "somehow" (**A32**), and "something that I just picked up" (**A48**). Her approach to learning has also changed. She now seeks to understand rather than "repeat, repeat" (**A16**) as she did at school because she realised this approach was problematic as it did not prepare her for employment (**A17**).

Zayeed is quite explicit in ascribing the change in his thinking to the course for "You change because you acquire knowledge" (**Z37**). He relies on people for this, and has had to learn to "open up" to people (**Z37**). He now finds class debates fun. This is a change which happened gradually "It's not been one specific spark where everything has immediately changed overnight" (**Z39**). Although he thinks he does not consciously change the way he writes (**Z42**), it is very different to how he approached his writing in matric (**Z4**).

Pumeza realized that it was she who had to change in her thinking about things rather than just change her use of words**.** She concludes her account of how she discovered the meaning of a term, and the function of discourse: "So you have to, to change" (**P25**). Her experiential learning brought an appreciation for what she was learning. She could relate to what she was learning which made it easier (**P5**). Pumeza also appreciated the constructive help she got from one lecturer to improve her writing – where others just gave her a fail mark he showed her what needed to be changed (**P71**).

Thandi believes that at a personal level "You don't change" (**T6**), despite her family's expectations that she will change because of her higher education. She has changed her approach to writing significantly since her first year when she had "no clue what an assignment is" (**T22**), and was not able to use a book effectively (**T23**) and not aware of task requirement (**T25**).

5.2.1.4 Reflecting

Participants' reflection on and meta-awareness of their discourse acquisition.

Colin believes "one of the first times" he started thinking about his presentation style was at Scouts, in an incident which made a lasting impression on him although it was "such a small informal thing…" (**C37**). He is now aware of how he speaks at work, but "couldn't care less" when with friends (**C28**). He is critical of his writing only when preparing formal reports (**C11**). He perceives learning to be "basically about looking at how things were done. I would go back to a situation… and sort of 'crack' that, and say, 'how could I have done that better?' " (**C 46**).

Lindiwe needed to reflect on her dual identity as 'child' and professional in attempting to resolve the status problem this raised with workers. Despite their perceptions of her as a child, through reflection she was able to resolve the tension: "when I think about my age, I say, 'I'm a child but look where I am. I'm working" (**L10**). She has also had to change her way of thinking. She used the word 'supervisors' because "I thought since they were supervisors, they were supervisors and so I could use the term supervisor" (**L19**), only to discover she needed to be "very specific" (**L19**).

Andiswa is aware of reflecting on what her peers say: " …you tell yourself you are going to keep it and you are going to use it" (**A42**). She is also aware of thinking in Xhosa, not English and then translating what she has in her head into English as she talks (**A46**).

Zayeed connects his reflections on his religious beliefs to his professional understanding. He relates his respect for people to industrial relations, saying " Why hasn't anyone come forward with this? I made the connection. … Maybe I am the person to bring it up" (**Z49**).

Pumeza reflects on the manner in which a lecturer explained a concept to her and how it could have been better explained to her (**P26**). Through reflection she becomes aware of how she grasped the term, and why the process she underwent was necessary (**P27**).

Thandi reflects on her own performance in an attempt to find an explanation for unexpected experiences. After dealing with an unnerving experience in industry, she reflects, "to think about that –Ai! When you're going to be in your workplace it's going to be different"(**T18**). When she is surprised at the standard of work submitted by white students, she reasons "But… we were never given assignments in our schools" (**T36**). When she passes without knowing how to write a report, she comments about the lecturers "what we are doing…is not what they think" (**T66**).

5.2.1.5 Complying with values and institutional guidelines

Both professional engineering values a well as professional and institutional guidelines on academic writing are covered in this section. The focus here is on participants' compliance with conventions – their underlying ideologies and beliefs will be described in a separate section.

Colin perceives himself as becoming intolerant when people don't comply and do things as they should be, and that there is an "only way" (**C16**). He feels that by the time he goes to work he must have "that sort of thinking instilled" (**C17**) to avoid financial loss to his employer. He perceives language to be less important in communicating with other engineers (**C50**). Compliance with the standard report format prevents him from "appear(ing) stupid" (**C58**). If he is not sure about complying with report writing conventions, he would ask a secretary for assistance (**C58**).

Lindiwe perceives complying with professional values as a responsibility: "we have to say 'this is wrong' " (**L4**). Making these judgements is difficult, but she believes she is able to comply, referring to drunkenness at work as wrong ("So I had to put my

profession first before thinking about them liking me" **L18**). Complying with values and procedures is a way of establishing her identity as an engineer, ("When I view myself as an industrial engineer … somebody who can improve the working, the performance and the productivity of the company and it is required of you" **L15**). She refers to being able to identify problems as a central responsibility, something she "must do", on a number of occasions (**L24, L34, L49**), and "The way you solve them … So when you do that, that's when they say, 'oh, now she understands'." (**L49**). When writing an academic task she consults the logbook and textbook to ensure that she complies with the specifications. She does not want to deviate from what she was taught, and does as she has learnt, to make "sure that it is the right thing"(**L41**).

Andiswa identifies strongly with the values of the other student engineers and the company. She experiences sitting and drinking coffee during work as "a waste of time" (**A23**), and is committed to redesigning things to increase productivity (**A25**). She judges everyday items in terms of the practicality of their design (**A3**). In her planning the format of her report she tries to comply by following a library book and tries "to write my report, like what I'm seeing" (**A 56**).

Zayeed acknowledges that there is a "right way" and "wrong way" (**Z35**) of doing things, and differentiates between these in terms of "end result" (**Z1**). He expects a "specific reason" (**Z1**) for complying with convention, and feels that convention could make people "think with blinkers on" (**Z35**). He challenges rules, saying "rules are meant to be broken. But not certain rules" (**Z33**). He incorporates the rules of his faith into his living and professional life (**Z50**), but does not feel constrained by professional conventions (**Z51**). He perceives his academic writing to be constrained by what the lecturer wants, and thus deliberately asks the lecturer what he wants (**Z12**). He regards the lecturer's guidelines as a "formal system" he "should follow' (**Z8**) to help him get better marks. He follows writing convention in terms of format, and perceives conventional writing as "having a introduction, having summary, having a conclusion…"(**Z8**).

Pumeza believes "Sometimes there are standard procedures … there is no other way. When it's something that's not a procedure then you can do it the other way then there is no problem" (**P37**) This makes her willing to take two other versions and develop her own from them (**P35**). She appreciates the need for compliance in using engineering terminology so that "they can know you've taken shapes into consideration"(**P33**) rather than general scientific terms. She is selective in complying as she believes "it depends entirely on the lecturer" (**P32**), and will "put thing as they should be" (**P32**) only when she doesn't know the lecturer. She is aware of the need for task compliance in her assignment writing, and goes to the lecturer to comment on her drafts so that she "knows exactly what he wants"(**P67**). She perceives compliance with writing conventions to have strategic gain: "If I'm going to get better marks, I have to do exactly what Mr K is telling me" (**P71**).

Thandi values the ability to change, improve or add things on (**T13**). She complies with requirements for assignment writing even though it makes no sense to her, because it has strategic gain: "you do it just because you have to get marks, not for learning something out of it" (**T46**). Her perception of complying with report writing is of "having sections" (**T64, T28**). This she can do despite feeling that she doesn't "know what is actually – what is needed" (**T64**). She is aware of the need to comply with task requirements and consults the lecturer on this (**T33**).

5.2.1.6 Knowing

Colin regards knowing as an essential part of establishing his credibility and status (**C7**, **C8**), but also feels comfortable in asking for help when he does not know something (**C27**). He perceives the ability to generate ideas as "something more important" (**C43**) than knowledge itself. He also believes that the ability to 'spin' can be an effective substitute for knowing (**C9**).

Lindiwe believes there are two kinds of knowing: knowing that comes from practical experience and knowing that comes from reading. To her, knowing from experience is

"something that is real. You experience you feel it. You know how it is, unlike when you are reading in a book" (**L16**).

Andiswa believes that she began her studies not knowing anything, and only when she "knew the basics" did she feel better (**A4**). She often refers to things she didn't know, but feels she should have known: how to write a report and use a computer (**A5**), how to draw a straight line free hand (**A36**), what she was reading about (**A16**). She perceives of knowing as understanding in her own words – which is different to "just reading" to pass the test (**A15**).

Zayeed perceives of knowledge as an object external to himself which, through accretion, results in a change in himself: "You change because you acquire knowledge" (**Z37**). He refers to knowledge as something in a book (**Z7**), something which is collected in preparation for writing (**Z18**), and something he can store in his room to refer to when ever he needs it (**Z23**).

Pumeza perceives of the expansion of knowledge both as something others do to her ("when I came here, then they expanded on my scientific side" **P22**) as well as an activity she needs to perform (**P23**). The discovery that she needs to know things differently in engineering (**P25**) is significant to her. Her realization that she needs to adjust her old ways of knowing to make it appropriate to the context (**P26**) is significant to her. She regards knowing as the first stage in appropriation: "You start to understand it then you use it" (**P30**). Pumeza refers to cultural, industrial and academic knowledge, which all differ from each other (**P20, P51**).

Thandi perceives knowing as a complex state in many contexts. She acknowledges that workers know things differently from the way she knows them and considers and respects this in working with them ("because they know that more than you according to themselves" **T2**). She also contrasts the different ways in which she knows things: she describes knowing about assignments, but not knowing how to produce one (**T23**), she differentiates between knowing with and without understanding: "I know it is as it is in

the book, not as if I know it like understand it or in my mind" (**T44**). She perceives a big difference between having information and making sense of information (**T32**). Knowing without understanding amounts to "taking information from somewhere else. You don't know about it" (**T55**). This enables her to make the lecturers believe she knows, "but you actually find out that you don't know what was actually happening. You just memorised" (**T66**). She feels frustrated that sometimes her way of knowing is inadequate: "I, you know the assignment, that is the cover page the, … the index, the text, introduction to text, but you don't know what is actually – what is needed" (**T64**). She believes that to know the technical aspects requires effort and a critical approach "because I don't know it just from the beginning. I have to make myself some questions" (**T41**). To know the non-technical aspects (like presenting an assignment in a flip-file and time management) requires experience (**T35, T37**). "Like you are not used to this, but as the time goes on, I think the second semester then okay, you know" (**T37**).

5.2.2 *Mitwelt*/ self and others

5.2.2.1 Judging others

Colin's perception of others centres around a distinction he makes between "lower people" (**C7**) and his superiors, people he perceives to be "very similar to me" (**C33**). He interacts with the two types differently, always behaving in a way to "match your surrounding people" (**C3**). With his superiors he communicates easily and openly. They discuss sport which facilitates their professional communication (**C33**). He is aware of making a good impression on his superiors because of how they could influence his future: "I always keep at the back of my mind that these lecturers, I'm using them for references " (**C59**), and of industry superiors, "I think …because it's your profession, it's your bread and butter. And you are going to move up according to what your superiors think of you" (**C41**). He perceives successful people as sources for his own development, observing them to see what he can "take" (**C45**) from them, or what they have that he "needs" (**C18**). He perceives workers as a "lower class of people" (**C3**), who think in

fundamentally different ways to him, something he would not have discovered had he not worked as one of them (**C51, C52**). In speaking to them he tends to "degrade" his language, adopting their accent so that they understand him (**C53**). He also deliberately "got chatting" (**C66**) with the workers, something "which I think did help me" in gaining their co-operation in what could have been a tense situation.

Lindiwe perceives other people in terms of her responsibility to them. She feels both a professional responsibility to consider how her decisions "will affect other people" (**L1**) and a social/cultural responsibility, "to respect them [older people]" (**L6**). She is aware that her professional position makes her unacceptable to other people, and that she is even viewed as an "informer" (**L2**). She finds women easier to work with than men because their interaction is free of culturally imposed gender roles (**L9**). From the manner in which she deals with drunken workers, it is clear that she sees the people she works with both in professional and personal/social perspectives, but judges their behaviour purely on professional terms: "I know that most of them, they liked me, but what they were doing, I know it was wrong" (**L18**). She is sensitive to personal rapport in her professional dealings with other people, and is appreciative of the recognition she gets from them (**L13**). She has a sincere and natural empathy for others (**L18, L20**).

Andiswa perceives lecturers and students as distinctly different from each other. The lecturers make her feel inferior (**A4**) or nervous (**A11**), and don't teach her much (**A6, A38**) as they are too "advanced" (**A40**). The students make her "feel free" (**A12, A4, A41**) and help her learn (**A6, A7, A8, A36**), in a way that she retains what she learns from them (**A9, A42**). She also makes a distinction between "WE as industrial engineering students" (**A23**) and the workers, based on the way the two groups think about productivity (**A22**). She perceives this distinction between students and workers entirely in professional terms. The workers "just want to keep their jobs and that's it" (**A22**), they "do what they are told" (**A21**) and don't think about improving productivity. The students are critical of the ways workers perform their jobs "because we want to improve the company" (**A24**).

Zayeed perceives other people as instrumental in his learning and tries to tap into what they know as "a more person-to-person interpersonal relationship is much better because he can explain …" (**Z17**). Other people are "the best way to get information, and "more beneficial" (**Z22**) to him than other ways of learning. He values a friend because "he brings a lot of experience into our friendship" (**Z30**) which Zayeed regards as an "added advantage" (**Z32**) in doing assignments. Zayeed draws on his religious value of respect for other people in his interaction with them in all spheres of life, including his professional interaction (**Z47, Z48**).

Pumeza's relationships with other people are important in her learning and she is aware of the role that the nature of her relationship with others plays in how she feels about herself and the work "So, it's not really difficult but it's about … who you are going to talk to in the relationship" (**P6**). She values other people and feels that "it's really necessary to have a second opinion, to know what the other person is thinking" (**P43**). She is open to other people and is aware of being judged by them. "They are asking me questions so that they really know that you know what you are talking about" (**P14**). She perceives others in terms of her cultural norms in which age has precedence over youth, and women must be submissive to men. She got on well with her mentor because "he was still young" (**P46**), but found that changing the working style of factory workers was difficult "because you'd find a person who is older" (**P47**). Her perception of older men as superior ("you have to shut up and listen and heed what ever he says to you" **P49**) makes it difficult to deal with men. Although she does not have a problem working with men, she perceives women as more understanding (**P60, P54**).

Thandi esteems others irrespective of their relationship to her. She expresses her respect for the workers as an obligation to make them understand what she is doing. She feels she needs to explain herself, "you have to tell them" (**T2**), "you have to make them understand" (**T19**). She has not changed her feelings towards her family although they think highly of her because of her education. She sees them as she does herself, " You are just like them" (**T6**) although she knows that as an engineer her thinking must be "different from other people" (**T13**). She describes her initial dealings with other people

in terms of anxiety: She felt afraid of the lecturers in her first year (**T34**) and of the workers' reactions on the first day in the factory (**T16**).

5.2.2.2 Being judged or assessed

In this section participants' sense of being judged as they establish their identities as engineers as well as their experience of formal assessment will be described.

Colin is constantly aware of being judged. He believes that "people definitely judge you by the way you speak" (**C54**) and he consequently tailors his speech to his audience. By being "definite and concise" (**C7**) he believes people will see that he knows what he is talking about, and respond better to him. He is "definitely aware of what people think about you at work", and even "puts(s) on a bit of an act … just to be more accepted" (**C41**). He feels his professional future is dependent on how others judge his speaking and writing (**C12**). On campus he focuses on content as he believes lecturers rate this higher than expression (**C59**).

Lindiwe is aware that she has to establish her credentials in two arenas – the academic and professional. In both she must establish that she understands what it means to be and perform as an industrial engineer. (L36, L49). She focuses on what she regards as the most important criterion in each context. In formal academic assessment what matters is demonstrating familiarity and compliance with methods (L36), while in industry the worth of her work is judged on the solution she presents to the problem (L49). She believes that in formal assessment she cannot expect "any favours" (L42) from lecturers but must comply with task requirements, in assignments this amounts to a case of "do this and do that" (L42). Lindiwe is aware also of the judgement of the people she works with and draws pleasure from the recognition she got from her manager and subordinates (L12, L13). She is however not daunted by the knowledge that in performing her duties some workers "will view you as an informer" (L4).

Andiswa discovered that she could survive formal assessment through memorization ("I passed but I didn't understand anything" A15). Although this seemed to satisfy her

lecturers she felt it was inadequate because it would be of no value to her at work. Expressing her own ideas in class was difficult at first, but made easier by a particular lecturer who was never dismissive even of wrong ideas (A30). She feels this indirect judgement was more meaningful than passing without understanding.

Zayeed describes being judged only in terms of his observance of Muslim principles even in his professional interaction. "If I break those laws, … I will be punished" (Z50). His judge is Allah.

Pumeza is aware of being judged constantly. She perceives the managers' questions about her presentation to be for them to "discover … do you really know what you are talking about?" (**P14**). Although she seeks her mentor's judgment on her draft report (**P42**), she is also pleased that her logbook is subject to less scrutiny than those of other students (**P17**). When writing for lecturers she knows she is less careful about her writing than if she does not know the lecturer, she then "put(s) things as they must be"(**P32**). She gets lecturer feedback on her drafts because she realized the importance of task compliance ("So how do you want it to look?"**P69**). She deliberately uses mechanical discourse to signal her understanding to other professionals (**P27, P33**). When dealing with workers with whom she shares her primary discourse, she finds it more difficult "to convince them you are doing your job, but then at the same time you still respect him" (**P54**).

Thandi regards assignment writing as an artificial task "something you do just because you have to get marks, not for learning something out of it" (T46). She is aware that she needs to meet stipulated task requirements so she consults the lecturer "because he's the one who wants the work done" (T33). Sometimes she "can have the marks" (T66) without knowing, because assessment is about memorizing and complying. The assessment feedback is inadequate, leaving her feeling "you don't know where you went wrong" (T63). She is aware also of the judgement of her rural community – they revere her ("giving you wings" T7) because of her studies. She feels this is unwarranted because "there is nothing that has changed" (T6) about her.

5.2.2.3 Imitating and role models

Colin deliberately imitates successful people, looking at them closely to see what their good qualities are so as to "take those" (**C45**). He admired his mentor for his knowledge, conciseness and confidence, and was aware of thinking "that's the way I also want to be" (**C18**) and imitated his manner of greeting everybody (**C19**).

Lindiwe makes no reference to imitating other people or role models. She does however, consult a first year textbook to ensure that what she was doing was not of her own invention (**L41**), and keeps referring to the logbook which "tells" her what the report must be (**L22**).

Andiswa is convinced that her report writing improved because of her imitation of other students' reports: "I saw from other students the way they were writing their reports … I'm still imitating what I learnt from the students" (**A9**). She also learnt to use a computer by asking other students to model the command for her: "I had to ask the other students after class to do this for me and again and again until I knew you must click the B" (**A 39**). She feels more comfortable modelling from students as lecturers are too "advanced" (**A40**). She perceives men students to be better models than women, as they have a better technical background than the women have (**A35**).

Zayeed identifies the prophet Mohamed as his most important role model (**Z47**) and models his interaction with other people on his teachings about respect. He recalls being shown examples of seniors' reports in his first year as a model of how he "should be writing" (**Z9**). It contained concepts he did not understand then (**Z10**). He has built a friendship with a peer around that student's work experience, and values him as a friend because of his work experience (**Z30**).

Pumeza names one of her lecturers as her role model (**P70**) because of the constructive role he has played in her development. She sometimes imitates her lecturers and tells how, when faced with different guidelines from her lecturer and industry mentor, she

preferred imitating her lecturer (**P34**). She refers to learning to understand and use engineering terminology like "learning a new language" (**P31**). She feels it is better to learn terminology from books "because when you read the explanation it explains even the implication, where you can use it and everything" (**P30**).

Thandi resists modelling herself on others' stereo-type of a woman engineer as a tomboy (**T10**). She also resists imitating a peer who tells her to draw with a T-square, saying "why should I" (**T69**), but does what she believes is right and only acknowledges she needs to imitate when she is shown that her way is inadequate. She learns from a peer – but with reluctance.

5.2.2.4 A man's world

Lindiwe lives in a world where a black woman engineer is perceived as "very 'out'"(**L28**). She is aware that where she comes from is economically and socially far from the world she now occupies and is "very lucky" to have moved into an environment that offers her future prospects (**L27**).

Andiswa feels disadvantaged because she is a woman. She is wrongly assumed to have had the same technical background that the men have had at home (**A45**). She perceives an advantage in learning with men as it is a way that she can tap into the technical background she lacks.

Pumeza's world is one in which men predominate, and seem to doubt her competence as a woman engineer (**P13**). She does not experience this as uncomfortable but finds her current class in which women are in the majority, "more open, more comfortable" (**P60**). As a black woman engineer she experiences two worlds in one, a situation that is "really, really difficult" to cope with (**P52**). Her place of work is a both a professional site where she must display her "professional side", but also a cultural site for during breaks and lunch time, she must be "their woman they know" and display her culturally submissive side (**P52**).

Thandi finds the factory where she works a stressful place because of the workers initial response. They wolf whistled at her because they are not used to women as engineers (**T15, T16**).

5.2.3 *Umwelt* /self and objects

5.2.3.1 Sites of learning

Colin regards his work environment as disciplined with no room for waffling or error (**C2, C17**). He perceives a difference between the focus of learning that occurs in classrooms and "out there" (**C21**), and believes that in terms of knowing how to work with people he has learnt more "in life" (**C32**) than in the course, referring to his experience in Scouts (**C36, C37**). Group work in class is contrived compared to what he's learnt in "the working environment" about working in groups (**C36**).

Lindiwe feels her work environment imposes a clear professional responsibility on her (**L11**), but she also perceives it as a site of cultural responsibility because "almost everybody there was a man and they were very old", which made it "very very difficult"(**L5**) for her as she tried to meet both her professional and cultural responsibilities. In industry she felt "lost, …so alone" (**L25**). She perceives a "BIG difference in the environment" between industry and the classroom because on campus she learns vicariously, and is dependent on the experiences of the students and lecturers. The classroom is also a place of judgement where her performance in industry is discounted "as a student – who's been to Eskom, who knows what's going on in Eskom… you are nothing"(**L48**).

Andiswa perceives the academic world as a place that disadvantages her in various ways. She is wrongly assumed to have had the same technical background that the men have had at home (**A45**). As a Xhosa speaker she cannot use her "own language" to learn. "It's not very helpful because, the Technikon words, you can't use the Technikon words"

(**A45**). The confidence she has in her ramp modelling (**A13**) is not accessible to her in the classroom where she feels nervous and shy (**A11, A31**).

Zayeed perceives his world as a unified place that is uncomplicated, stable and yielding. He sees "many facets" (**Z47**) as being covered by his Muslim faith and does not experience any tension between his professional world and religious world. It is a place where people conform – he equates it with the artificial existence in *The Matrix* (**Z34**). His academic environment provides him with step by step guides of what to do (**Z6, Z8**) and an enjoyable classroom set up (**Z39**). It yields the information he needs simply and clearly in the form of explanations from other people (**Z38**). He can contain and control knowledge by storing it in his room (**Z23**).

Pumeza's world is bilingual, and she uses "our language" in a homogenous group, and English with which she is comfortable in heterogeneous groups (**P65**).

Thandi finds the classroom and factory two very different places for learning. The classroom is not conducive to authentic learning, but in the factory "you are actually doing it … it's not a question" (**T50**).

5.2.4 *Überwelt*

5.2.4.1 Ideologies

This theme differs to that on compliance as it focuses on the participants' awareness of and commitment to the underlying ideologies which support their perceptions. Colin and Zayeed clearly articulated their underlying ideologies and seem to have reflected on their ideological positions. Pumeza skirts around ideological issues but seems unaware of her position. Lindiwe, Andiswa and Thandi make no ideological statements as such, but position themselves through their reactions to ideologically loaded issues such as gender stereotypes and cultural traditions.

Colin believes in merit and capitalism. He is committed to finding out "how could I have done that better" (**C46**) and appreciates people who "do a little extra" (**C44**). He is concerned about creating a good impression on people who judge him (**C12**, **C41, C58, C59**) and links making a good impression to future prospects. He believes in doing things to obtain maximum financial gain for himself (**C41**) and his company (**C17**), and refers to the workers' views on "capitalism and how it is evil" as other to his own (**C52**). He believes things "should be" done efficiently (**C13**, **C16**).

Lindiwe acts out of respect (**L6**) and responsibility (**L1, L11**) to other people. Although she describes it as difficult to be a black woman engineer, she responds light heartedly, commenting only that "especially men – they don't want to deal with it" (**L28**). She seems quite comfortable with her position and takes no overt ideological stance on the matter.

Andiswa feels that as a woman she has been educationally disadvantaged in not having "the basics of technical things" as the men have (**A35**). She shows no resentment about this, and chooses to work with men rather than women 'because "you learn more if you're working with guys" (**A35**), she seeks redress on a person rather than social level.

Zayeed is a committed Muslim who believes his religion covers "many facets" of his life, including the professional (**Z47**). He grounds his dealings with others on respect, and sees a clear connection between his faith and his professional work. He refers to traditional Muslim principles of respect which have recently been "discovered" and imported into industrial relations (**Z49**). He believes that he must incorporate his principles of faith into his professional life, for the consequences of breaking those laws is that he "will be punished at the end of the day"(**Z50**). He has a very different approach to the laws or conventions of society. In this context he believes "obviously you have to follow specific rules and guidelines" but at the same time that "rules are meant to be broken"(**Z33**). He lives by this and always questions "why, why, why?" (**Z27, Z40**), expecting a "good reason" for doing something in a prescribed manner (**Z1**). He is drawn

by the message of *The Matrix* and believes that people are too easily blinkered, unable to venture out of a prescribed path (**Z34**).

Pumeza feels that in industry the people she worked with "were dependent on me, and I had power over them" (**P16**). The source of this power is her technical expertise (**P18**), and she felt prepared, empowered, because of her training (**P19**). Her faith in technical expertise is tempered by her culturally based respect for other people, which sometimes made the exercise of her power "difficult" (**P47**). This involves proposing changes to their working style to improve efficiency and productivity (**P47**). She says "I know and I have to tell him what to do – that's my job. So that's when you have to, to at least create a relationship" (**P51**), a position which is a compromise on a pure technocratic ideology. In the same way, she comments on her difficult position as a woman in engineering without adopting a feminist point of view. Although she is somewhat irritated and slightly affronted by the manner in which men treat her, (**P12, P13**) she seems accepting of it and is unable to judge it as sexist, "it's almost, sort of, sometimes, Ja, they knew I'm an industrial engineer, but they have got … but she's a woman" (**P13**). She is resigned to her submissive cultural role as a woman (**P53**).

Thandi is aware of the difficulty she experiences because she is a woman, but she too, is not a feminist (**T15**). She is aware also of the racial inequality in society but takes it in her stride, doing whatever she can to work around it without feeling resentment (**T34-T37**). Although she is accepting of traditional race and gender divisions in her community, she neither endorses nor complies with them. She is pragmatic and individualistic because she gets on with achieving what she wants despite society's constraints and expectations (**T8, T9, T11**). She is confident about being able to transcend social expectations and has a clear future focus "In future I am this person … so I might as well start practising now" (**T14**).

5.2.5 Self and time

Parts of this theme are contained in other themes - particularly in "development" which obviously implies a passing of time. But students' awareness of past and future emerges as a theme and is included separately, so reflecting Van den Berg's demarcations. Adhering strictly to the demarcations of Binswanger and Van Deurzen-Smith would require that student's awareness of past and future be placed under one of the four dimensions they name. The data from students just didn't fit any of the four – and as fidelity to data takes precedence over strict adherence to a particular demarcation, I have added Van den Berg's dimension of self and time.

Colin is quite explicit about not wanting to go back to his job as an operator in the factory. He knows "I never ever want to land in a position that I have to go and do a job like that again" (**C4**), and this motivates him. He believes his future prospects are determined by his performance and behaviour in the present. He is "definitely aware of" (**C41**) what his superiors at work think about him, and "always keep(s) in the back of my mind that these lecturers, I'm using them for references when I go for jobs" (**C59**), and he thus pulls the future into his experience of the present.

Lindiwe experiences her present as a transition between her past and her future. She says " I know where I came from, I know what it means to be here to me, …I have something to look forward to" (**L27**). It is her awareness of past and future – and how different they are – that imposes her sense of responsibility " Because I know other people, I have, I know I have the responsibilities, whatever I do I have to be responsible" (**L27**).

Andiswa's concept of herself as deficient is linked to her past experience. Of her past she says "When I came here I didn't know anything" (**A4**). When she describes the things she can do or has learnt to do, she links them to her awareness of the future – her need to

understand things (rather than memorise) when she learns (**A17**) and the ability to express her opinion in class (**A33**).

Zayeed's awareness of time is described in terms of his faith. His belief in a future judgement serves as a guide for his current behaviour (**Z50**).

Pumeza links her awareness of her social, cultural and professional sides to her awareness of past and future. Both affect how she experiences the present. Her socio-cultural side comes from her past "Yeah, I can switch back because I'm still living in that" (**P59**). Her professional side is linked to her future: "what I'll be doing in five years time is based on my professional side" (**P58**).

Thandi experiences her past as providing continuity at a deeply personal level despite the changes she undergoes at an educational and professional level. "You don't change. You've been with them when you were in high school, when you were in primary, there's nothing that has changed" (**T6**). She is not trapped by her past for despite becoming aware of the disadvantage of her schooling, she does not feel fettered or limited, and refers to it in a very matter of fact way (**T36**). She has a strong sense of her future and reaches out to it " In future I'm this person, …so I might as well start practising now (**T15**).

5.3 General statement

A general statement is what makes it possible for the reader of a phenomenological study to "come away with the feeling that 'I understand better what it is like for *someone* (my emphasis) to experience that'"(Polkinghorne 1989: 46). So far my description has focused not on what it is like for someone, but on what it is like for Colin or Thandi or one of the others to experience the acquisition of engineering discourse. Colin is a white man whose education and life generally benefited by the apartheid policies, and whose aspiration to become an engineer is quite ordinary: Thandi is a black woman whose education and life generally were disadvantaged by the apartheid policies, and whose

aspiration to become an engineer is quite extraordinary. Their experiences are very different and their interpretations of them unique.

But the pure description of the experience of a single person (or even six such descriptions) is the stuff of biography. I am not a biographer. I am an educationist working with a phenomenological methodology, and must write, as Polkinghorne says, "an accurate, clear and articulate description" of "what it is like for someone to experience that" (1989:46). So, what follows is a general description of the structure of the experience of acquiring the discourse of engineering.

There seems to be a link between **confidence** and discourse acquisition. Any growth in confidence is significant to the students and seems both to determine and be determined by their professional and classroom performance. Part of what they acquire is professional and academic confidence. But a certain level of confidence seems necessary to even start learning. There is a sense in which they bring confidence with them, but also a sense in which they take confidence from their learning. Confidence is a condition for learning, but also the result of learning. Moments of doubt, of not knowing what to expect, of feeling inadequate or scared, of not having a clue, of being lost are experienced by all the students at times, but it seems as if they regard these as part of the process, rather than as part of themselves. It is the confidence within themselves that enables them to overcome these moments and not be permanently overwhelmed by them.

The students are aware of themselves having **multiple different identities**. In most cases this revolves around being both a student and an engineer. Although their experience of who they are is linked to the context in which their learning occurs (classroom or industry) it is not entirely determined by the context. The women students are also conscious of being women in a society where at best women engineers are a novelty or at worst, it is taboo for a young woman to tell a man, particularly an older man, what to do. They are aware that their identities as young black women are perceived by others as conflicting with their identities as professionals. They experience this awareness differently; some as a difficulty while others take it in their stride. Their responses and

ways of coping with this multiplicity also differ, but no one denies either her professional or cultural identity.

The students all acknowledged significant **development** in their professional abilities and expertise over the three-year period, but this development was not always ascribed to the course. Some students are vague about how the change occurred; others can relate it to specific people or events. The development they experience affects a wide range of aspects in their lives, technical and academic expertise, interpersonal relationships, attitudes to other people, general outlook on life, learning strategies, writing ability, way of thinking and confidence.

There is evidence in all students' experience of **reflecting** on what has happened to them and incorporating it into the overall experience of acquiring the discourse. They draw on varied experiences including non-academic and non-professional, but reflecting on them, these experiences contribute to their formal learning. They seem not to be systematic in their reflection – but reflect when an experience is powerful and jerks them in some way.

Students refer to **complying** with professional values as well as academic (specifically writing) requirements. They seem to comply blindly with the latter –going through the motions even though they do not understand what they are doing. In this their purpose is always strategic gain (mostly better marks). Their compliance with other (professional, cultural and religious) values or guideline seems more reasoned and involves a sense of true commitment, of buying in or appropriating the values. In contrast to the academic writing rules, students seem to apply these values not for strategic gain, but for fulfilment and self-realisation

Knowledge seems to be regarded as a defining aspect of self as students talk about knowledge in relation to themselves variously in terms of change, status, fulfilment, and sense of self worth. They seem to regard knowledge or knowing not as a one dimensional single thing, but refer to knowledge or knowing as multi-faceted. and complex.

The students' **relationships with other people** involved in their discourse acquisition seems based on a **differentiation or judgement** they make between types of other people. In most cases this amounts to an overt us-and-them classification with the students aligning themselves with one category, which differs in a significant way from its opposite category. These classifications included student-lecturers; student-engineer; student-workers; black-white; man-woman; young-old; lower-superior. Two students referred more obliquely to classes of people, making only indirect or covert references to categories of people (students with and without industry experience, engineers and non-engineers).

Students' sense of being on display or **being judged** by others, both formally and informally, is high and affects their performance. They are constantly aware that they need to display their expertise, confidence and ability. As professionals they need to display to the people they work with that they know what they are doing, and as students they need to display to the lecturers that they know what they have been taught. Students are aware that in different arenas they are judged by different criteria, and display what is required in each. When they are aware that they do not have the necessary expertise or ability, they deliberately attempt to create the impression that they do, by using alternative strategies that enable them to display what is expected. Being judged is not about revealing their true expertise or ability, but about being able to display required expertise or ability.

A third factor in their experience of their discourse acquisition is **imitating** and following **role models**. They all look outside themselves – to successful professionals, other students, lecturers, texts (books) or a god – to know what to do. The person or thing to be imitated may be sought out and imitated in a systematic and calculating way, or may arrive unsolicited in the student's awareness and be imitated reluctantly or incidentally. Although what the students imitate of that person is used in their professional or academic performance, the person being imitated need not be a professional or academic.

The women students are very aware that their discourse acquisition occurs in a **man's world**. The performance of professional engineering tasks becomes more complex as they have to work around the subtle prejudices or blatant sexism in industry. They are neither militant about it, nor do they exploit it - they approach it in a matter of fact manner and get on with being woman engineers. In the classroom it is less of a complication but something that the women do comment on. The men make no mention of their maleness in their learning (neither in the classroom nor in industry), an omission that resonates with the women's experience of both worlds being male dominated.

There seem to be **two sites of learning** that differ from each other - the classroom and industry. Industry seems to be regarded as the site of authentic or real learning, and the classroom of theoretic or vicarious learning.

The students seem **committed to various personal ideologies** which, although different, serve a similar function – to make sense of what is happening to them and around them. They are motivated by and committed to these ideologies. Some students are more conscious of their ideological stance and seem to have thought about it, others align themselves with an ideology by default. These ideologies include capitalism, 'ubuntu', Islam, technocracy (compromised), and a pragmatic, a-typical feminism. The women are all aware of the sexist environment in which they learn, but not one takes an overt or typical feminist stance. It is as if they avoid it, choosing rather to get on with what needs to be done to obtain their qualifications: they are pragmatic. They seem not to feel constrained by traditional roles and expectations of women, but to consider themselves the equals of men: they are feminist. In their pragmatism they empower and liberate themselves as women. Theirs is not an overt or typical feminist ideology, but a pragmatic feminism which enables them to transcend traditional values.

Chapter Six

Discussion

Why do you imagine they never understand
Things? They too can be alert to all this
Absurdity about what you think they think!

Jack Mapanje (In Canagarajah 1999: 39)

6.1 Understanding and explaining

The review of the literature on discourse, writing and learning ended with the phenomenologically sound reminder that a study such as this is not about my figuring out which theory best accounts for the students' experience. It is about understanding the students' experience of acquiring engineering discourse. However, as researcher I become aware in travelling with them that I have been there before, on another journey, in the realm of theory. It would be strange indeed if at times there were not some sense of *déjà vu* as I worked on my description of their experiences. But that is as far as a phenomenological study can go in terms of theory – the focus must remain on the experience of the participants.

Their descriptions bring flashes of previously read theory, sometimes unexpectedly combined with other theories. But like an experience of d*éjà vu*, it is the present experience that is 'real', the sense of familiarity, whether it be clear or vague, is detached, something different. This study is about their experience presented in the form of my transformation of their naïve descriptions. Even where it resonates with theory, the phenomenon, the experienced reality of acquiring the discourse, remains central. The theory is called to mind, but does not lead the transformation, description, or discussion.

It is possibly at this stage - the discussion of findings - where it becomes most important not to be led or prompted by theory, but still to remain faithful to the data. My purpose is not to **explain** the students' experience in terms of a particular theory, but to stay with **description and interpretation**. In this chapter I offer a discussion of the findings, not

an explanation. The purpose of this study is to understand and not to explain, what Van den Berg refers to as *verstaan en verklaren* respectively (Van den Berg 1972: 5). At this stage to discuss my findings in terms of how they fit with any of the theories reviewed in chapter two, would be in breech of my methodology. So, while the conventional expectation at this point may be that an explanation follows in this chapter, I attempt to **illuminate** my findings through discussion – not to **explain** through theory.

This does not mean that I make no reference to theory – I certainly do. But such reference is to illuminate, to highlight, to bring into focus through contrast with existing theory where appropriate, the experience of the participants. It is not to make definitive or prescriptive pronouncements on the acquisition of engineering discourse. Where I make a direct reference to theory in discussing my findings, it is by way of contrasting and comparing them to the theories reviewed and so to gain a new vista on the experience of acquiring the discourse of engineering.

6.2 Overview

Before embarking on my discussion, I offer an overview of the study so far. In chapter two where I surveyed the literature I noted the emphasis in writing theories on the students' awareness of rhetorical aspects. Such rhetorical awareness is at odds with my classroom experience and may be linked to the nature of the research on which writing theories are based.

Some research (Bartholomae 1988, Fairclough 1989, Kress 1989, Gee 1996) was based on discourse analysis of texts rather than the experiences of the writers. Some research (Berkenkotter, Huckin and Ackerman 1991) used writing teachers rather than ordinary students as participants. Not all theories were developed from research in higher education; those studies situated in higher education were often in arts (Bartholomae 1988, Geisler 1994, Ivanic 1998), and not science (or engineering) programmes. Research done in science (Halliday and Martin 1993, Lemke 1995, Bazerman 1981) was based on texts and discourse analysis. Some research (Chiseri-Strater 1976) although

ethnographic and situated in higher education, had clearly articulated ideological agendas. Theories of learning were often too general and said little about discourse or writing – as if somehow what was being learnt was assumed always to be informational content. A series of studies of student learning in an engineering faculty (Meyer *et al*. 1990 and Meyer *et al*. 1992) focused on the study orchestration associated with test and exam preparation but said little about discourse acquisition or the learning of the learning of writing in engineering.

My sense that the theory was inadequate as a lens through which to examine and understand my students' experience should not be not taken as criticism of those theories. Those theories have been insightful, vital, generative. They were just not quite adequate for understanding the position I found myself in with these students. Wherever my theoretical journey took me I was never quite satisfied. It took me a while to realize that what was worrying me was not: what should I be doing with these students? Theory had given me ample answers. The question I needed to ask was not about me, but about them. How do they experience the acquisition of engineering discourse? I want to know how they experience the acquisition of engineering discourse – as students, in an engineering programme, in what can be considered a typical contemporary South African higher education classroom. To understand this I would need to take a different approach.

Phenomenology offers the philosophical and methodological base to provide the kind of understanding that I seek. To understand their experience I could not work with student texts. Twelve years of marking their texts has unavoidably left me with an impression (albeit second hand) of what they are experiencing as they acquire the discourse of engineering. But the text is not the person. Inferences about people's actions, intentions, or experiences based on texts will always be inferences, second hand. To know how the individual experiences discourse acquisition the researcher must engage with the person, not the text. Where research in writing and discourse theory tends to focus on a text I propose to focus on the individual's experience, the phenomenon of acquiring the discourse of engineering.

Phenomenology seeks to understand the person in terms of his or her *lebenswelt*, not to understand the world (or objects in it, like a text) independently of how it is lived or experienced by the individual. In this respect my study takes an unusual look at student writing – it doesn't examine student texts. It is concerned with how students experience the acquisition of engineering discourse.

My data are thus not texts, but transcripts of the interviews with students. Nor do I analyze the discourse of the interview. In analyzing my data, I look not at the words the students spoke, but at the meanings they created as they shared their experiences with me. And yet they create meaning in words – (the meaning created in non-verbal ways is largely lost in the transcription). I'm not looking at how they use words to create meaning. I'm looking at the meaning of their words – what acquiring the discourse of engineering means to them.

From the transcripts I selected excerpts to form the natural meaning units. These were analyzed and transformed into the discourse of writing pedagogy. The experience was described for each participant in the six situated descriptions. Through analysis of the situated descriptions I identified the themes – the essential aspects of the experience for the students, what emerges when the experience is considered no longer as a unique and situated experience, but in its essence. The themes were condensed to develop the general description of the experience of acquiring the discourse of engineering presented in the previous chapter.

6.3 A new picture

The picture that appears from the general description in the previous chapter is complex – it shows the students becoming engineers in a multi-dimensional way that encompasses all parts of their being/existence:

An **awareness of self, which** is described in terms of:

- confidence in coping with tasks
- having multiple identities
- development (or change) in abilities, beliefs, attitudes and perceptions
- reflection on what is happening to them in academic/professional as well as non-academic/professional situations
- complying with academic or professional norms without experiencing conflict
- a view of knowledge and knowing

Interaction with others and things around them in acquiring engineering discourse which is characterized by:

- a sense of being judged by others in terms of their academic, professional and social performance
- a willingness and ability to judge others professionally and socially
- the imitation of others and things (not only academic or professional) in their academic and professional performance
- the dominance of men in engineering

An awareness of the **world around them** which is described in terms of the different sites in which learning occurs.

A **reliance on various ideologies** which function as orientation.

A clear sense of personal **past and future which** motivates and guides them in the present.

The focus remains on the individual and unique aspects of their experience and I discuss what is significant about their experiences where they vary or differ from theory, but also where students' experiences resonate with theory. I thus refer to theory only in an attempt to extend our understanding of their experience.

6.3.1 Confidence

Confidence is described as both a cause and effect: a condition for, and an outcome of learning. All but Andiswa refer to incidents where their learning is the result of their self-confidence. It is what enables them to engage with the unknown in the first place. Zayeed refers to being willing to make mistakes in class because that is how he learns. Pumeza is less aware of how her self-confidence drives her, but it is her confidence to confront the lecturer about how he explained the term *centroid* that triggers her discovery that she has to change the way she thinks about things, and not just the names she gives them.

It appears that this propelling confidence is something they bring with them, and that they draw on confidence they have from other spheres to keep them afloat in higher education. Lindiwe's confidence comes in part from her involvement in her school debating society; Colin learns confidence in Scouts; and Thandi displays great confidence in her Transkei[24] upbringing – it has got her this far and she has no intention of changing herself now. Andiswa displays self confidence in her ramp modeling work, but she does not draw on it in the classroom and describes herself initially as being shy, nervous and scared.

Their experience of feeling confident does not prevent them occasionally feeling insecure. In fact such experiences of insecurity are an essential part of their discourse acquisition. These fruitful moments of insecurity are fleeting or short lived; they do not endure or permeate the experience in a manner that hamstrings the student. Colin, who is overall a very confident person, refers to an "unconfident feeling", but consoles himself when he realises "that's natural". Pumeza also uses her feelings of insecurity to transcend the situation and is thus not trapped by it. When she realises that a good presentation is about the relationship she has with her audience, she is able to relax, become more comfortable and gain confidence.

[24] The Transkei was a Bantu homeland until 1994 and remains one of the most under-developed and under-resourced regions in the country.

Their experiences do not convey the same sense of inferiority referred to in the literature, particularly in the theory of "authentic voice". Ellsworth (1988) refers to "the repressive myth of the silent other" arguing that we need to reconsider critical pedagogy and the theories of student voice particularly, for it "sees the student as 'empowered' when the teacher 'helps' students to express their subjugated knowledges" (1988: 308). Colin feels superior about his position in higher education and with the workers, and refers more than once to people who are "lower" than him, and to "degrading" his language when speaking to them. Andiswa is the only student who emphasizes her sense of inferiority, and she links this directly to her placement in a preparatory course before being admitted to the mainstream. It is worth noting in this regard Rose's argument based on his own experience of disadvantage, that students can cross the boundaries of disadvantage "once they meet teachers who recognize that disadvantage is constructed by the system, not a characteristic of people" (Rose in Ivanic 1997: 83).

The sense of inferiority referred to in theory but lacking in their experience of discourse acquisition flows from an awareness of authority, of relations of relative power between student and lecturer. Bartholomae uses the word "dare" to describe what a student must do initially: "he must dare to speak it to carry off the bluff, since speaking and writing will most certainly be required long before the skill is 'learned'" (1988: 273). I find that the relations of relative power are not as central in the students' experience as is portrayed in theory. Two different student experiences of lecturer authority are particularly telling.

In the first Andiswa refers to being "scared" in class as a first year and Thandi says she did not consult her lecturer for guidance on the assignment as she may have been "afraid of the lecturers". She goes on to link this fear to the type of school she attended, implying that white students who would have come from very different schools, would not have experienced this. Although this fear of lecturers may seem indicative of the great power differential between student and lecturer (authority), in the context of postapartheid South Africa there is political factor which may well be far more significant in causing the relative power distance than the customary student-lecturer

distance referred to in theory. For black students who attended racially segregated schools where their teachers were second language speakers of English and often under-qualified, their experience at the Technikon may be the first they have with a teacher who is a native speaker of English and unable to switch codes to provide back-up explanations of the work. The ethos of the Technikon differs from that typical of the ex-DET schools (DET: Department of Education and Training – the racially segregated education department responsible for providing education to black children under the apartheid government. Although under the new government there is now one integrated nation education department the physical resources, teacher qualifications and ethos of schools previously under the DET are generally not yet on par with those in traditionally white schools. The results of the external matric exams indicate the extent of disparity). The difference in ethos is particularly evident as far as expected student participation in class is concerned. Many students were schooled for twelve years in drill learning in class, and did not volunteer answers – or questions. So the fear may have been of the sheer foreignness of the participatory mode of interaction in class, and not of the disciplinary authority of the lecturer. Thandi, even though she stops off halfway conveys this meaning: "because not all of us –". This fear is experienced only by black students.

In the second incident, Lindiwe dumbs down her authority when describing her Eskom project to her examiners. Lindiwe does this because it would not do for a student to display the actual power she does – she knows she knows more about the project than they do. She knows she has performed well in industry, but she stands before her examiners as a student who is "nothing". She does not really feel she is nothing – she is not intimidated by their authority – on the contrary, she deliberately foregrounds her identity as a student instead of her identity as an engineer. Central to Lindiwe's experience of authority is her semester of experiential learning, from which she would have generated the content. I will discuss experiential learning again under sites of learning.

Students do not experience plagiarism as an issue of authority as it is often described in the literature (Bartholomae 1988, Pennycook 1994, Angelil-Carter 1995). They plagiarize

because to them, that is what writing calls for. Zayeed says writing is useful in learning because "you copy out all the facts" and Thandi says "it's like photocopying". There is no sense of not having authority, or of feeling silenced in the presence of experts. They describe copying information from books or the Internet and delivering it untransformed to the lecturer without reference to plagiarism. This is because in their conception of assignment writing, shifting information is all there is to writing. (I discuss the difference in their perceptions of assignment writing and report writing at length in the following chapter.) To them writing does not have a rhetorical dimension. As they do not regard writing as doing something with text, attribution (who did the doing) and voice are not a concern. Authority comes from information. If you've got the information you've got the authority. This a very shallow conception, but one which nonetheless shields them from the angst and inferiority often experienced by students as they grapple with a more complex and rhetorical understanding of authority in the academy and academic writing.

But just as confidence is a necessary part of the learning process, it also grows as a result of the process, and then motivates or enables further learning. Being able to perform successfully builds confidence for Colin when he completed the project in East London. Even Andiswa describes how, after finding the confidence to voice her opinion in class, she feels pleased, and knows that her confidence has improved somehow.

6.3.2 Multiple identities

Students' awareness of themselves as having multiple identities is a dominant theme in their experience of self in acquiring engineering discourse, and closely tied to the manner in which they adapt their behavior to fit the context, their interaction with other people, their sense of being judged, their awareness of past and future, and the women's experience of engineering being male dominated.

The notion of multiple identities is not uncommon – and various theorists have examined identities and discourse: Ivanic (1997) explores the notion of the discoursal construction of identity, Gee (1996) refers to discourse as an "identity kit" (1996), Goffman (1969)

uses the metaphor of a an actor and a character, Angelil-Carter (1997) looks at identity and power using a metaphor of a skeptron, Bourdieu (1977) introduces the term "habitus" to describe the individual in a social context, Thesen (1997) focuses on the agency of the individual in establishing identity, and Bartholomae (1988) examines the relationship between the student and the institution.

Although these writers differ in terms of the role of individual agency, common to all of these theoretical discussions of identity and discourse is the notion articulated by Ricoeur (in Martin 1999: 188) that identity always encompasses the existence of the other – a notion that fits comfortably also with a phenomenological view of identity or self. In Van den Berg's four dimensions of self, other was one dimension within which the self is experienced - and understood by the researcher (1972: 31). Binswanger uses mitwelt to name the other as a dimension within which the self is experienced - and understood by the researcher (Binswanger in Spinelli 1989: 128). Spinelli argues that intentionally constructed objects – which include self and others – "cannot be viewed as being experientially independent of one another" (1989: 26). He points out that this sense of interdependence is so strong that the term "not I" is preferred by phenomenologists to the term "other".

Identity is "a misleadingly singular word" (Ivanic 1997: 11), or one which contains "semantic ambivalence " for "it connotes both sameness and permanence, difference and change" (Martin 1999: 188). Martin describes identity as

> a complex phenomenon, a 'cross-road' where multiple identifications meet, producing at the same time, or in succession multiple attachments; that 'identities' are in other words, multiple, nesting and interlocking. … They are the outcome of a long and complex process where self-definition and exo-assignation are confronted, where choices are made for affective and strategic reasons, where some identities are given primacy over others. (1997: 88)

Identity when used in this sense is quite contrary to the naïve everyday sense in which identity is used to connote a single embodied person. In this sense identity is associated

with one – as in identity document, identity parade – and traditionally having multiple identities is regarded as abnormal. And yet, in their naïve descriptions, students referred often and explicitly to their multiple identities – as a normal part of their discourse acquisition. They experience it not in a pathological schizophrenic sense, but as Martin describes, as a intersection where either simultaneously, or successively they have different identities that interlock or nest within each other.

Multiple identities are the outcomes of choices made for affective and strategic reasons. Martin's definition refers to "exo-assignation" as well as agency ("self-definition") thereby indicating the part of the individual in the construction of multiple identities. Identity should not be conceived only as fixed categories ('woman'; 'engineer') but as "the dynamic interaction between the fixed identity categories that are applied to social groupings … and the way individuals think of themselves as they move through the different discourses in which these categories are salient" (Thesen 1997: 488). Such a conception of identity allows for the greater agency experienced by the students in this study. Discourse theorists are inclined to emphasize the social construction of identity and understate the individual's participation in that construction. My data point to an understanding in which there is evidence of social construction and individual agency – of identity being orchestrated (i.e. choosing to foreground one identity) by the individual. Gee argues that his theory allows "ample room" for "individual style and human agency" (1996: 167), and he implies a sense of symmetry when he says "Discourses 'capture' people and use them to speak' throughout history…. People 'capture' Discourses and use them to strategize and survive " (1996: 149). But his notion of "colonization"(1996: 146) and his reference to individuals being marginalized by Discourses (1996: 132) imply a determinism not experienced by the students in this study.

Ivanic makes a distinction between four aspects of writer identity in terms of writing: the autobiographical self, the discoursal self, self as author and possibilities for self-hood (1997: 23). This is a useful distinction in understanding the students' experience of multiple identities.

- The autobiographical self is not some "fixed essential 'real self'" but the identity they bring with them to the act of writing and includes their "prior social and discoursal history" (1997: 24).

- The discoursal self refers to the way a writer wants to sound. It is linked to a particular text and is thus fleeting. The same writer in another text can sound quite different – portray and be another self.

- The self as author is a relative concept, for writers vary the extent to which they "claim authority as the source of the content of the text" (1997: 26). This is a significant factor relating to plagiarism in academic writing.

- The possibilities for self-hood refer to the "prototypical possibilities for self-hood which are available to writers in the social context of writing" (1997: 27). They are the various ways in which the same things could be done – some ways being more privileged or acceptable than others.

The first two of these are particularly useful constructs for understanding the students' experience of discourse acquisition. The first is useful for understanding the students' experience as embodied and located in a social history – a view which does not blur my phenomenological lens of self-and-body, self-and-others, self-and-time, and self-and-objects. The second is useful for it speaks of the intentionality of the writer or speaker to portray a particular self – in this case self as a young engineer, and/or self as a student, and/or self as a black woman.

In the next chapter I discuss how their experience of their multiple identities influences their writing, because in higher education that is the formal manner most often used for assessing a student's discourse acquisition for graduation and certification purposes. In terms of the certification requirements of the Engineering Council of South Africa (1999) and of the South African Qualifications Authority (1998), such assessment should include not only knowledge, but also ways of knowing, doing, valuing and writing. As will be

apparent from the discussion in this chapter, the students' awareness of their multiple identities is not limited to writing, but also to speaking, thinking, valuing and behaving. Discourse here includes the full range of activities comprising a social practice rather than the linguistic aspect of expression.

Colin talks of being both student and engineer simultaneously, although he feels more of an engineer, and prefers feeling like an engineer to a student. Lindiwe identifies herself as both. She is also aware simultaneously of her identity as student and engineer and deliberately places her identity as engineer in the background when being assessed by lecturers, even though she is confident of her performance as an engineer. She knows also that the intersection of her identities as black woman engineer is 'very out' to others – particularly to men. Pumeza, sensitive to her community's social norms, very clearly sequences her multiple identities. She deals with her multiple identities by "switching" between them, so that to others she is either "their woman they know" or a professional. She is both, and free of social norms she describes herself as an "ambitious girl". She is able to foreground the identity that best suits her – choosing to think of herself as an engineer rather than a student while in industry, and downplaying her identity as a student in her professional interactions with others. Thandi, also aware of how her multiple identities as woman engineer are perceived by others, chooses deliberately not to conform to stereotype identities society creates. Although Zayeed does not refer overtly to multiple identities, he experiences his identity as a student acquiring the discourse of engineering as nesting or embedded in his wider identity as a Muslim. What they experience is what Peirce describes in post-structuralist terms an "identity which is constantly changing across time and space" (1995: 9). But their experiences differ from post-structuralist notions of identity in which multiple identities are associated with "sites of struggle". These students clearly experienced an awareness of their multiple identities - and link their experience to their experience of time and space. (Time and space both emerged as themes and are discussed later in this chapter.) What did not emerge was an experience of "multiple identities as a site of struggle" (Peirce 1995:9).

Even where the identities are irreconcilable or in conflict in the eyes of others, the students don't experience the tension as an internal struggle between or among their multiple identities, and there is no sense of alienation. Alienation and struggle differ from tension – and while tension may be inherent in social life, it does not necessarily follow that there must be struggle and alienation. Thesen (1997) uses discourse (structure) and voice (agency) as the linguistic representations of what she regards as the "fundamental tension" between structure and agency (1997: 494). She explores students' experience of identity as they make the transition from high school to higher education and finds that individuals do not experience their identities only in the structural categories familiar in theory (gender, race, class). She argues that new ways of understanding student identity are necessary for critical literacy/discourse theory "fails to attend adequately to the agency of individuals and the way they locate themselves in relation to discourses" (Thesen 1997: 487). My findings too, show that theory may not "attend adequately" to the students' experience of identity in higher education.

There is a difference between the experience of tension and the experience of struggle or conflict. Thandi describes how her home community in the Transkei expects that she will change because of her higher education, but she is adamant that "There is nothing you have changed, nothing, absolutely nothing. That's because you are coming from the Technikon. That's all there is". Her experience on entering the engineering programme is not of an identity crisis (involving conflict or alienation). She adds this new identity to her repertoire. She does not lose anything in becoming an engineer, but gains another identity. She does not experience her discourse acquisition as creating a new identity as an engineer to replace her previous identities. To understand how students experience their discourse acquisition in their undergraduate years one must let go of the notion of a single identity – as well as the notion of a public-private identity.

The students do not experience having a single private identity which they distinguish from their public identities. Such a public private distinction would imply that at times (or places) they are their private selves, at other times (or places) their public selves. This public private notion lends itself to the role-playing metaphor: that the private identity

takes on a public role which may require the hiding of the private and so result in alienation or conflict. (I return to a discussion of role playing and alienation later on).

The women's instinctive reliance on their 'private' identities (young black women) to perform the tasks of their 'public' identities (engineers) makes such an understanding difficult. (In a different context young black woman is a public identity). Students seem not to make the public private distinction central to many theories of literacy (Courage 1993: 485).

What then about Colin "putting on an act" to be more acceptable? This may be an experience of public private identities, but it may also be part of his personal style. He constantly positions himself towards other people in a way that will be most beneficial to himself – like being aware that he needs good references from his lecturers and flirting with the "black mamas" at work so that they will co-operate with him.

What their way of coping with multiple identities reveals is that they start to dwell in a new world with new ideas and new people and new values which they appropriate, by **adding** to their experience of themselves. It does not involve sacrificing any previous or other self, or silencing a private self. Their acquisition of engineering discourse results in the acquisition of a new and additional identity, which does not cause an internal struggle. Where there is conflict between their identities it is in the eyes of others – this is very clear from the way the women say others ("they") think it is odd for a black woman to be an engineer. They switch between these multiple identities, or live with an awareness of these 'conflicting' identities without experiencing the sense of alienation or struggle contained in many of the theories on writing, particularly those in the critical pedagogy tradition. (I will return to this point in my discussion of compliance.)

A significant part of experiencing the self as having multiple identities is that students are, or become the identity they choose to be. While the context (the time and space factors) or other people may well be what prompts them to foreground a particular identity, it does not determine identity. Their experience of multiple identities shows a

large measure of what Martin calls "self definition", of choices being made for strategic and affective purposes (1999: 188).

So Lindiwe feels she is an engineer when she works at Eskom, but a student when facing her panel of examiners on that work. She says she knows that she knows more about the project at Eskom which she is describing to her examiners, but for strategic reasons becomes a student, who is "nothing" in the presence of her examiners. She chooses her identity. Colin prefers to think of himself as an engineer rather than a student as he feels students are stigmatized. When working in industry he feels "it was a bit of both, a bit more like an engineer". He chooses his identity. Pumeza "switches" between identities to meet her affective and strategic needs – she feels confident about being an engineer in industry, but when interacting with the workers socially she demonstrates her willingness to "be their woman", the submissive, deferring young black woman. She chooses her identity. She is "their woman" because it is what gives her the authority to behave appropriately on the factory floor. She is calculatingly consistent in switching identities. She is in control. When she uses the words "have to" in terms either of her submitting to black men or directing black men, she links it immediately to creating a relationship with them. To her it is part of the give and take of social or professional interaction and is a matter of expediency rather than constraint. It is about the self interacting with others. Pumeza refers twice in the interview to building a relationship (once in the context of older black men, once in the context of the audience of her presentation). Where discourse theorists talk of struggle and conflict that results from the experience of multiple identities, she does not. To her it's not about struggle within yourself, it's about building relationships with others.

The students manage their multiple identities for affective or strategic gain. Angelil-Carter writing in an ESL context says that identity within discourse is "multiple and ever-shifting" (1997: 266). She links the shift to the speaker's (or writer's) perceived position of authority relative to an interlocuter. Although in some instances this does account for the shift, my data show that the individual retains agency. Lindiwe experiences being a student when describing her industry work to the examiners. I

believe that Lindiwe was not really intimidated by her examiners, she did not really feel that she was nothing. She knows she knows more about the project at Eskom than they do, but being a mere student in the presence of her examiners may have greater strategic gain than being the engineer she was while she worked on the project. (A bit of 'exam technique' for presentations). She does not believe they have the power to make nothing of her experience. This is about being polite – or in more cynical terms, expedient or strategic behaviour. She has agency.

Lindiwe's decision to change her identity could arguably be perceived as failure to challenge the authority of the lecturer. However, I think she is showing her insider status of the faculty discourse here. She knows the rules of the game of exam presentations, and is playing it masterfully. What she does demonstrates that in an apprenticeship the roles of the listener and speaker are not interchangeable (Ball, Dice & Bartholomae 1990: 351). And yet, she is no voiceless victim of the system but a powerful insider who is in the process of what Gee would call 'accessing the goods' – the goods in this case being marks. (The ideological nature of discourses is discussed further under ideologies.)

Students' identities are not externally determined, nor are students possessed by their multiple identities, nor are they the locations of an inner struggle between these multiple identities. Students' identities may be socially constructed (in the sense that they are developed always in terms of the other), but the students choose which of these constructions to inhabit. They do not become what the community expects or constructs of them – they are or become what suits them. They have agency. As Thesen points out, they are not easily or simply categorized (1997: 498). They straddle categories creatively. The women transcend (without rejecting) the rigid and still strongly held views on submission to older men because they want to be engineers. And they do this without denying their identities as young black women.

Gee's critical discourse theory tends to be deterministic. He indicates that a relatively big distance between an individual's primary Discourse and secondary Discourse, is likely to cause an experience of alienation or inner conflict in acquiring the secondary

Discourse (Gee 1996: 146), and that Discourses will marginalize those who differ in terms of central values or ways of doing things, and so create inner conflict for those individuals (1996: 132). He says that dominant Discourses "stack the deck" of power as that they privilege certain kinds of people (1996:137) – in higher education this is white upper middle-class children of professional parents, in engineering this is men.

Colin – the only student who in Gee's terms could be considered to be playing with a "stacked deck" – refers to advantage and frustration. When there is a term he doesn't understand he just asks his father. But he finds the pace in class too slow, and that work he did at school is being repeated. The game is changing, it is not so clear any more what constitutes a "stacked deck" of discoursal power. The black women do not experience their identities as black women as disempowering – in a very important way they have power, a "stacked deck" that Colin does not have: Xhosa. They speak the language and know the complex social practices that go with it. When it comes to working with the operators in the factory, the "stacked deck" of the classroom may no longer be such an advantage.

Thesen working on student identity in a contemporary South African context says that although the theories of Kress (1989), Gee (1990), Fairclough (1992), Peirce (1995) are "useful analytical tools" they are "limited in what (they) offer to the understanding of the relationship between individuals and larger social processes in *periods of rapid social transition*" (my emphasis 1997: 488). While those theories may offer ways of understanding individual identity in stable societies they may not be equally adequate for understanding individual identity in societies undergoing "rapid social transition". I expand on the implications of the nature of the society for the individual acquiring the discourse in the section on compliance.

How the black women respond to being engineers is a "creative solution to straddle" their awareness of the two discourses, and illustrates what Cazden calls "a transformational act in which (one) does not have to compromise" (Cazden in Thesen 1997: 498). They

are not the one playing at being the other. The same applies to their experience of student-engineer identities – they are not the one playing at being the other.

My data incline me to believe also that their awareness of their multiple identities may differ from role playing, a metaphor used in the literature (Goffman 1959; Bartholomae 1988; Gee 1996). Role playing has a sense of pretence or deception, of making a deliberate effort, of following a script, which is not how they seem to experience their multiple identities. Role playing is about being somebody you are not. Multiple identities is about being various numerous somebodies you are. In role playing the intention is to satisfy the community, to follow the community's script in terms of your behaviour (and may even involve hiding the self). With multiple identities the intention is to satisfy the self in terms of affective and strategic considerations. There is a stronger sense of agency in having multiple identities than there is in role playing.

Referring to roles that the individual takes on in order to present a self to others, implies being somebody she or he is not. This is the kind of thing Colin means when he says "I would probably tend to put on a bit of a, an act, you know, not in a bad sort of way – just to be more accepted, I suppose". This, Maslow would say, is only human.

But one must not read more into it than an attempt to be polite or expedient (making oneself socially palatable on occasion, is not the same as becoming what is socially determined). It should not be taken to the point where it is leads to a distinction between a private and a public self, a distinction which I believe may limit the agency of the individual. The public private distinction is based on the *ethos* and *persona* distinction first made by Cicero and Aristotle (Ivanic 1997: 10): e*thos* being the private self and *persona* the "public, institutionally defined aspect of identity" .

The public private distinction is what enables discourse theorists to posit theories in which conflict and alienation are a central experience. Gee argues that conflict arises when the individual becomes aware that her private discourse (primary Discourse) is unacceptable in the public discourse (secondary Discourse) and attempts to hide or deny

her private discourse. And so, her private identity becomes alienated from her public identity. My data differs from discourse theory on the point of conflict and alienation. While this difference can be traced back to the distinction between public and private identities evident in theory, it is not present in the students' experiences.

Various writers allude to a public private distinction (Bartholomae 1988, Chiseri-Strater 1991, Courage 1993) in their writing. But such a distinction would imply that there is a private or essential self that can be separated from the public (the institutionally defined or imposed) self. That there is a single 'actual' identity in terms of which all participation in secondary Discourse becomes a form of not being the 'actual' self, but of role playing. Such a conception is not possible within a phenomenological view of self as being experienced in the dimensions set out by van den Berg (1992) or Binswanger and Van Deurzen-Smith (Spinelli 1989). So when I talk of their multiple identities it should not be taken as an term interchangeable with role playing. In fact this difference – of multiple identities not being just role playing - is one way in which my understanding of the students' experience of discourse acquisition differs from my theoretical understanding of discourse acquisition.

Courage argues that a useful way to understand the centrality of the public private dichotomy, is to differentiate between academic and non-academic literacies. Using Bartholomae's distinction, he argues that academic literacies would be public, but that not all non-academic literacies are private (1993: 485). Based on his research with mature students learning to write, he suggests that public non-academic discourse (for example, a Pentecostal evangelism) may contribute to the development of public academic literacy, while private non-academic literacy not (for example, personal correspondence). Using Bartholomae's distinction (1988: 276), he proposes a dialectical approach rather than a dichotomy. This is a softer version of the public private dichotomy which allows for the successful incorporation of a 'private' discourse (private in the sense that it is not part of the professional discourse of engineering, but drawn from the initial socialization of the individual such as deferring to men, or observing a Muslim principle), into a public discourse. Nonetheless, it implies a separation of public and

private identity, the existence of a discrete 'actual' private identity which is not evident in the students' experiences. Courage indicates - almost in passing - that the public private distinction "may be concretely transcended through processes of social and institutional change" (1993: 485). I discuss social and institutional change again later, but feel it necessary to point out that the public private distinction is established in the context of social stability, and inversely, to link the weakening of the public private distinction to social and institutional change.

Bartholomae an influential theorist in the field of discourse and writing in higher education, conceives of what a student writer does in acquiring the discourse in terms of a metaphor of dramatization which suggests role playing rather than multiple identities. He depicts what a student does as "an elaborate …but necessary and enabling fiction" in which "(t)he student dramatizes his experience in a "setting" – the setting required by the discourse" (1988: 274), and that "it is very hard for them to take on the role" (1988: 275). My findings are not of students taking on roles, but of being multiple identities as they acquire engineering discourse. They <u>are</u> an engineer, and/or a student, and/or a young black woman and/or Muslim. They do not disappear into the wings of an academic stage production and reappear a few moments later in a different guise with a different voice as a different character playing a role.

Gee uses a similar metaphor when he argues that an individual's behaviour is meaningful only in terms of the Discourse or competing Discourses that give meaning to that behaviour. He says: "It is much as if we are reciting lines on a stage, but where there are often several possible scripts or plays that could make sense of the lines… " and "…as if I tried to play two or more roles in a play simultaneously" (1996: 167).

Related to the notion of role playing is the function of imagination. Bartholomae emphasizes the need for students to imagine saying all writers "must imagine for themselves the privilege of being 'insiders' – that is, of being both inside an established and powerful discourse, and of being granted a special right to speak." (1988: 277). But Bartholomae's emphasis of imagination is not evident in the students' experiences for

they do not talk about imagining the right to speak. They talk rather of feeling they have earned the right to speak. They have earned it through their knowing, doing, valuing as engineers in industry.

Their frequent and direct references to being engineers (as opposed to being students or being young black women) indicates that they feel they are engineers rather than students who must imagine being engineers. Their awareness of themselves as engineers comes in part from the people with whom they work. Colin says he felt he was an engineer when he was doing the project in East London. Lindiwe knows exactly what she must do to convince the lecturers that she understands what it is to be an industrial engineer, while the workers' perception of her as an "informer" provides evidence of her insider status from a different perspective. Pumeza is granted insider status by virtue of being regarded by the people in her department as a replacement for the engineer who had just left, and by her mentor who allows her to make decisions without checking them with him first. Andiswa includes being an engineer in her us-them distinction between herself and the workers and points out how her valuing and thinking in terms of productivity distinguishes her from the workers who think differently.

What becomes apparent in the data is that students experience being an engineer and do not role play or imagine being an engineer. There is a sense of entitlement in their speaking as engineers that differs from the hesitancy Bartholomae implies when he says "they must dare to speak it, or carry off the bluff, since speaking and writing will most certainly be required long before the skill is "learned" (1988: 273).

Bourdieu's concept of legitimacy being granted to a speaker when the following conditions are met is useful for understanding their experience as it introduces the concept of entitlement. He argues (Bourdieu in Carter-Carter 1997: 267) that an utterance is regarded as legitimate (that is, that of a legitimate speaker and not an imposter) when it is spoken:

- by a person legitimately authorized to do so

- in a legitimate situation
- to legitimate receivers
- according to legitimate syntactic and phonetic forms.

The students speak not only as students, but also as engineers, so obviating the need to imagine as referred to in theories of academic writing. What enables - entitles - them to experience it as being an engineer rather than a student taking on the role of an engineer, is the structure of their course which requires that one year is spent in industry for experiential learning. In this way their experience of discourse acquisition is very different from that of students who are enrolled in composition classes or are learning to write for purely academic purposes in a classroom situation. Such circumstances inevitably have a sense of inauthenticity, of not being real – and hence the likening of learning to write in a particular discipline with role playing. (I discuss this experience further under sites of learning.)

Having discussed their experience of their identities as engineers, I look now at how they experience their other identities, which are possibly more easily established for there is a physical aspect to them. Their identities as students are uncontested – they are full time students and even carry identity cards to prove it! They are all aware of their student identities, although some indicate that this is a less desirable identity. Colin feels students are stigmatized. Pumeza, because she wants to be an engineer and not a student, is acting and treating herself as an engineer. Zayeed feels compromised by not yet having done any experiential learning – his identity as a student is more prominent. As a student he does not try to imagine what being an engineer must be like - he uses his friend's engineering experience to his advantage in a collaborative writing task.

The women are all acutely aware of being young black women and what this entails for them in being engineers. In describing their experiences of discourse acquisition in terms of their age, race and gender, they are expressing what Moore refers to as "an embodied subjectivity that takes account of gender, race, class, sexuality and other forms of difference" (Moore in White 1999: 100). They do not set aside their identity as women to

"take on the role" of a male engineer or "imagine" that they are men engineers (or white, or older for that matter), but experience their being an engineer as young, and black and woman. The self is not experienced separately from the body (Van den Berg 1972: 31). Although this experience complicates their being an engineer, they make no attempt to deny or rid themselves of that identity. They take it in their stride – for it is who they are. They show neither denial nor anger – when Thandi is wolf whistled at on her first day in the factory she experiences it as part of the anxiety of being in a new environment. She is quite comfortable with herself as a woman in the factory and says "the operators they're not used to females in (laughs) the workplace". It is they who are not used to it; they find it anomalous that a black woman is an engineer. The anomaly exists in their minds, not hers. Being a woman is who she is and it goes with her when she walks onto the factory floor as an engineer on her first day.

This experience of themselves as essentially black-women-engineers is different from the alienating experience of one of Thesen's participants, Robert. He feels alienated from his roots and expresses the wish to go back to Africa (1997: 498). The women in this study are always and essentially African.

White (1997) in describing her research on gender roles in Soweto argues for a theory of self development that allows individuals to behave contradictorily and to adapt their behaviour to different social contexts, to both flout and reproduce social norms. In South Africa black men still tend to expect women to be submissive to men (despite all the recent legislation aimed at equity). These young black women's experiences of becoming engineers cannot be separated from the society in which it occurs - a society not yet used to black women engineers.

Lindiwe's industry experience was "very very difficult" because she was working with older men. She does however, use her identity as a young woman to build a special rapport with the women operators. In the same way she draws on her ethnicity to interact with the men saying "it was one of the things I used to deal with people as I, as they were black and I'm black, so I knew how to deal with older people". Pumeza, who

switches between sides (the one an engineer, the other a black woman), says it becomes "really really difficult" at work when on duty she is an engineer, but off duty she is a black woman. Andiswa feels disadvantaged for having lost out on the technical exposure the men had as boys, but she sets about working with them so as to learn from them the things they learnt as boys.

The point to note here is that although their awareness of their multiple identities is experienced as difficult in this society, the difficulty is an externally imposed one, rather than an internally generated one. This difficulty is not about pitting one identity against the other – engaging in an internal struggle until one is silenced. Theory implies that the difficulty is an internal one – authentic voice theorists talk about students being complicit in their own repression, Gee talks about students being colonized, Peirce makes a collocation of "Social identities as multiple and a site of struggle" (1995: 20), and Bizzel, looking at it from a teacher's point of view refers to teachers being anxious when their teaching worked, "because we sensed that we were wiping out the students' own culture" (1982a: 236). I return to this concept of struggle when I discuss compliance.

While their experiences of student-engineer identities influences their writing (to be discussed in the next chapter) their experiences of identity in terms of age, ethnicity and gender seem to affect their face to face interactions – this is to be expected because in such interaction the body is present. It is responded to, as conventions governing social practice around young-old, black-white, female-male interactions come into play. In this manner the body is very much part of the student's experience of acquiring the discourse of engineering.

In terms of Bartholomae's theory students must leave behind the commonplaces of everyday life – what Geisler (1997) calls the "indigenous culture" - and start to try on the commonplaces of the academy. The women in this study seem quite comfortable with both sets of commonplaces and use the commonplaces of the indigenous culture to perform the commonplaces of the professional discourse. In their experience the two are not exclusive. Their behaviour/identity as black women does not make them complicit in

their own repression. It is a tool that they use. They do not experience what Bizzel refers to as "wiping out the students' own culture" (1982a: 236).

In the same way that Carter-Carter (1997) extends Peirce's (1995) idea of social identity and second language learning to understand the acquisition of academic discourse by a ESL speaker, it can be extended to engineering discourse to better understand the experiences of these students. Angelil-Carter shows how a disadvantaged black student gains power ("acquires the skeptron") in his interaction with her, a white academic, when the interview shifts to a topic of which he has knowledge that she does not have. I believe we can understand particularly the manner in which the women use their cultural knowledge (which we as academics do not have, or do not value) to speak as students and engineers. It is not so much a case of waiting to be given a special right to speak, but of having multiple identities which give them confidence and a sense of entitlement to speak as the selves they are. They are not a single identity - a student - who timidly takes on the role of engineer. They are multiple identities: student and/or engineer and/or young black woman and/or Muslim.

6.3.3 Developing

This is a theme that is experienced on the whole in a manner consistent with the notion of development and change that one finds in learning theories; Perry (1970) Entwistle and Ramsden (1983), Meyer, Parsons and Dunne (1990), Ramsden (1992).

Their development is experienced as gradual. Zayeed experiences it as a "slow change, a slow build up" and cannot pin point significant incidents that functioned as a "spark". They are unable to account for their development and have only a vague sense of it. Andiswa says that she doesn't know how it happened, and says of her becoming analytical that it is "something I just picked up here". Colin feels that it was in industry where he "picked things up".

One gets a sense of their development being fundamental – it is not only about acquiring academic or technical expertise. Gee, in referring to the ideological nature of Discourses says that the assumptions embodied in the Discourses "appear to us as natural, obvious, just the way things are, inevitable, even appropriate" (1996: 79). This is clearly the experience of Lindiwe who says "it's just the way it is" of using productivity to diagnose problems. To her it is "natural" and "obvious" and she experiences a deep awareness of her responsibility as an engineer. Lindiwe answers my question about how she knows something is a problem in industry, with "it's just the way it is". This may be evidence of Schön's claim that "knowing is *in* the action", and that although we may spontaneously and skillfully perform it, "we are characteristically unable to make it verbally explicit"(1987: 25). Colin is aware of becoming generally neater and more organized, and intolerant of people who don't do things properly, Zayeed has become more open with people, Pumeza comes to realize that she needs to change her manner of thinking about things and not just her words. Thandi resists change at a personal level, saying "you don't change", and the change she experiences is in her academic performance (her approach to writing). Except for Thandi, they believe development they experienced changed them as people.

6.3.4 Reflecting

The students reflect on technical academic content, about their writing, about moral aspects of their professional decisions, and about non-academic incidents which they incorporate into their professional development.

Pumeza's experience of coming to understand the meaning of *centroid*s is rich in reflection as a means of acquiring the discourse of engineering. She hears an unfamiliar term in class, asks for, and gets an explanation. Still unsure after the explanation she consults a handbook and finds it explained there in terms of a more familiar – but general – term: *centre of gravity*. She can now understand the term *centroid*. But she does not stop there. She reflects on why the lecturer did not tell her this – reasoning that had he but used this synonym he could have made it all clear

immediately in class. She confronts him and learns something even more significant – that it's not only about the word – the term – but about how she conceptualizes the term, how she knows the term. She discovers here what Martin means when he cautions teachers about dumbing down science in an attempt to make it more widely accessible "diluting science discourse necessarily involves diluting the science that is taught" (1993: 202). She discovers that technical terms are not just jargon, but that they actually organize the world in different ways to ordinary words (Martin 1993: 204). She discovers also that using technical terms appropriately is a means for signaling her professional status to other engineers. This is one of the "textual dynamics" expounded by Bazerman and Paradis (1991). Her experience of reflecting about *centroid*s makes a significant contribution to her acquisition of the discourse of engineering.

Students' experiences of reflecting when they write tend to be less complex and generative. They refer constantly to producing an assignment that satisfies the lecturer's information requirements and thus have a shallow view of assignment writing which does not require the kind of reflection Flower (1994) or Bereiter and Scardemalia (1985) propose.

Pumeza shows some development in her perception of a text - she moves from regarding it as a vehicle for channeling information to the lecturer, to regarding it as something she must do. Her conception of what she must do however, is "exactly what Mr. K has been telling me". This concept of writing will not "trigger conscious reflection" (Gee 1996:138) nor does it fit Flower's notion of problem-solving in response to the complex and rhetorical conflict experienced by the writer. So although Pumeza develops some sense of text as doing something, her awareness of task requirement is limited to following the lecturer's instructions. She does not reflect on her own writing. This is about learning to judge what the individual lecturer wants, and not the learning of a critical methodology Bizzel proposes (1982b: 202).

Lindiwe reflects on the nature of writing in comparison to speaking. To her writing is more difficult because she knows she has to show her reader that she has used the correct

procedures, but misses the live interaction there is in a face to face situation. In speaking her interlocutor has chance to ask "what do you mean?", but in writing she battles to "really explain what do you mean". She hints here at the type of rhetorical engagement Flower proposes in her pedagogy of the construction of negotiated meaning, and yet it is far removed from the astute awareness implied in Flower's approach which relies heavily on meta-cognition and reflection. Flower defines meta-cognition as an inclusive concept (that is, reflection and awareness) which signifies "thinking about thinking", and reflection as "an intentional act of meta-cognition, an attempt to solve a problem or build awareness by 'taking thought' of one's own thinking" (1994: 225). She argues that such meta-cognition and problem solving can be taught and builds her pedagogy around the view of writing as a literate act (1994: 28), rather than the skill implied by in the autonomous text approach. Her social-cognitivist pedagogy assumes a high level of awareness, of reflection and of rhetorical decision making by the writer.

Thandi reflects only on the presentation of her assignment when she compares it to those of the white students, she makes no reference to reflecting on the rhetorical aspects. Zayeed's experience of writing a group assignment makes no reference to reflecting – it's about directing people to collect information. Colin says that he would be more critical and aware of his own writing if he were writing for an industry audience than he would be for a lecturer – so although he shows an awareness of the need to reflect on his writing he is selective about doing it.

Their reflection is not critical in the sense of critical pedagogy, it is not used to critique the discourse of engineering. If anything it is for strategic purposes - to fit in, to perform well. Colin who observes and reflects on what he sees other do, says he aims to "sort of crack that, you know and say, 'how could I have done that better' ". Gee, in discussing the value of learning (as opposed to acquisition) says it is essential for the resultant meta-knowledge. Learning rather than the more natural acquisition is what "triggers conscious reflection" (1996: 138), and develops meta-knowledge, essential if a Discourse is to be criticized or changed. Meta-knowledge is what enables "one to manipulate the society in

which the Discourse is dominant" and can be used also as "a base for *resistance* to oppression and inequality" (1996: 147).

Although students do not reflect on their academic writing in the terms described in theory, there is ample evidence that they reflect about other things, including non-academic things and that such reflection is the means whereby a non-academic or non-technical event is incorporated in their professional development.

Colin's reflection on what his Scout leader told him about the way in which he uhms and ahs when he speaks made a significant contribution to his definition of himself as a professional – he is now aware of this in a work situation. From this came his effort to appear confident, of showing others that he knows what he is talking about. Zayeed's reflection on a principle common to industrial relations and his faith bears evidence of the type of reflection Gee refers to as using the one Discourse to critique the other. But where Gee goes on to argue that this leads to resistance, Zayeed experiences no need to resist – to him the two discourses are in synch. His comments about *The Matrix* show how he incorporates non-professional and non-academic experiences into his professional development. When Lindiwe is called "my child" by the workers, she starts to reflect on her position and this enforces her intense sense of professional responsibility as an engineer. Thandi reflects on and questions the general assumption that a woman who is an engineer is a tomboy – she rejects this line of reasoning saying that her being an engineer "is only in my mind".

6.3.5 Complying

In the general statement I pointed to a difference between their complying with academic requirements and complying with professional norms. In the case of the former their

compliance was unquestioning and held strategic gain, in the case of the latter it was reasoned and meaningful. This difference in compliance is not evident in the theory. Although Bartholomae refers to an initial period in which students "crudely mimic" the register of the discourse – this mimicry is an interim stage in the acquisition process, it is certainly not all there is to discourse acquisition (1988: 284). In the literature on writing and discourse, compliance or commitment comes not from mimicry, but from a deep personal engagement, often described as a struggle, or even in terms of alienation (I return to discuss the notion of struggle later in this section). In learning theories, however, this unquestioning but strategic compliance is recognized and explored, notably in the work of Entwistle and associates (1983, 1995). I examine this notion of strategic compliance with academic requirements before discussing their experience of a more fundamental compliance with, or commitment to professional norms.

Entwistle (1987) makes a distinction between deep learning, surface learning and strategic learning. This distinction is based on a fundamental distinction in the student's approach to learning: knowledge-seeking and understanding-seeking. Knowledge seeking students engage in surface learning and strategic learning. They believe learning is about amassing facts. They are attuned to what the lecturer wants (it may well be just information) and deliver accordingly. Understanding seeking students want to go beyond the facts, and engage in deep learning. They too need to be attuned to what the lecturer wants. Deep learning may lead to a true understanding, but without strategic learning it may be less significant or acceptable (in terms of grades awarded) than when combined with strategic learning (or for that matter, than surface learning).

The students' use of a strategic approach is what makes them willing to comply unquestioningly and mechanically with the requirements for academic writing. Colin says of his writing that "it's the old story": he ignores rhetorical aspects and is "concerned only that they know that I know". He goes on to say that he feels unsure whether the lecturers "really read through it" or "just glanced over it". He is up front about the strategic nature of his compliance with writing task requirements. He reckons they want evidence that he knows (in the form of information) and that is what he

concentrates on in his writing. Thandi says of her writing "you do it just because you have to get marks, not for learning something out of it". Zayeed says he follows the format "as that will help us get better marks". Lindiwe too, complies not necessarily because she understands, but for strategic gain. She says that she keeps referring to the logbook to make sure she is doing "something I had learnt, not something that I think". She believes that "writing a long thing won't help. Especially when it comes to the lecturers, because they don't read it, all of them".

This is mechanical compliance – prompted it seems, by the belief that writing does not matter to the lecturers. There is only one reason why they write: to get marks. There is strategic gain in complying with lecturers' requirements but there is no sign of rhetorical engagement in their assignment writing. Bazerman describes this as a cookie–cutter approach to writing (1988: 8), Bizzel refers to a "mindless-chore imposed by a martinet" (1982b: 202) – both by way of saying how not to write. Bereiter and Scardemalia (1985) investigated this alternative approach to writing and developed their theory of knowledge-telling. This is different to knowledge-transformation which results from a deeper and rhetorical engagement in writing.

Report writing differs from assignment writing. Lindiwe is aware that she can use her report to show that she has complied with procedure and so establish her credibility. "I specified what I used to collect the data so that it can be accepted at the Technikon. So they can see I was doing my industrial engineering job, not just any job". There is a marked difference between their experience of report writing and assignment writing to which I return in a later chapter.

I return now to discuss their experience of complying with professional norms. This compliance is reasoned and meaningful – they have taken on the values, the ways of thinking and doing, and (as evidenced by their report writing) the ways of writing engineering. They have as Bartholomae says "appropriated" the discourse of engineering. But this appropriation is not the result of a personal struggle or sense of alienation often referred to in critical pedagogy. While students do refer to tension in

terms of their cultural and professional identities, they do not describe their experience of this tension as an internal conflict or alienation. Critical theories however, are inclined to describe the process of discourse acquisition in terms of struggle, conflict or alienation.

Gee argues that because any Discourse is ideological, it will "*marginalize* viewpoints and values central to other Discourses" (1996:132), that "Discourses empower those groups who have the least conflicts with their other Discourses when they use them"(1996: 132), and that explicit teaching will not "necessarily mitigate very real conflicts between Discourses" (1996: 136). Such views are the result of what Thesen refers to as a "deterministic categorization of domination and resistance" (1997: 488).

Flower (1994) uses conflict in another sense in her theory of *The construction of negotiated meaning*. It exists almost as dissonance between outer forces (social and cultural experience, discourse conventions, language) and inner forces (the writer's own goals and available knowledge). If the meeting of the outer and inner forces results in conflict, and the writer chooses to respond by resolving that conflict in rhetorical terms (the writer could also choose to ignore it), he or she then engages in the construction of negotiated meaning (1994: 67). Meaning making does not always take place in "a peaceful valley of the mind" (1994: 34), and writing involves the resolution of conflict. Producing a written text without resolving the conflict, without engaging with the rhetorical demands, is characteristic of novice writers. But Flower argues that copping out is a possible response to the tension students may feel when the struggle to acquire academic literacy is too deep or too alienating. She refers to the studies by Erikson of Alaskan youths who experienced their schooling as a "disaffiliation" from the village community, and by Fordham of high achieving African-American youths in Washington who were rejected by their peers for "acting white" (1994: 34).

In South Africa a derogatory term for blacks "acting white" is 'coconut'. They are black on the outside but white on the inside: that is, they engage in social practices that are traditionally white (such as engineering), and aspire to values that are traditionally white. The existence of the term would seem to suggest an awareness of such behaviour among

blacks, so one may well ask why the black women make no reference to experiencing a deep and personal struggle in this context. In Gee's terms, acquiring engineering Discourse would be a disempowering experience by virtue of the conflict between it and their primary Discourse (1996: 132). They would experience being a 'coconut', that is, taking on values alien to those of their primary Discourse.

Such conflict certainly *is* experienced by students in contemporary South Africa, and nowhere more powerfully documented than by Thesen (1997) in her description of the experience of one of her co-researchers, Robert. He describes his awareness of his distancing from his roots, of his sense of loss of identity as an African in terms of a stance he takes in an essay: he chooses to write not about 'God' in the western sense but about *Modimo*. He later becomes troubled when he realizes that when he prays he says "in the name of Jesus Christ" because he believes that "Jesus was for some other people – not for Africans". This is one of the incidents he describes which lead him to the hauntingly eloquent :"now I'm in the middle of this – I don't even know myself - I'm not African I'm not European. You see, so I want to go back to Africa, that's the problem." (1997: 498). This is conflict, struggle, alienation. But for my students it's not part of their experience of acquiring the discourse of engineering.

When Lindiwe reflects on herself, her background and her future she simply says:

> I think of myself as a woman engineer. … I'm looking at myself at somebody who is very successful, very lucky because some people didn't get this far. So, that's what being myself means. I know what I, who I am, I know where I come from, I know what it means to be here to me, … Because I know other people I have I know I have the responsibilities.

She experiences her African roots, her professional responsibilities and the transition between them without conflict, struggle or alienation.

Bizzel in her critique of "authentic voice" and process pedagogies argues that as they are both individual focused, they "finesse the <u>essential conflict</u>" between academic discourse

and the cultural capital students bring with them (my emphasis 1982b: 195). Higher education in contemporary South Africa is in a state of transition as it undergoes a fundamental transformation at many levels. It can be expected that black students entering a historically white institution experience this as creating both opportunity and conflict. Yet the students not experience their multiple identities as a "site of struggle" as suggested by Weedon (Weedon in Peirce 1995: 159). If ever there was "a site of struggle" then surely a black woman becoming engineers in postapartheid South Africa is one.

Where the discourse of engineering does conflict with what Gee calls their primary Discourse (black women engineers having to tell older black men what to do) they experience it as socially "very, very difficult" or "really, really difficult", but not as an internal struggle or alienation.

While students are aware of having multiple identities which at times cause them social difficulty, they seemed not to experience themselves as a "site of struggle". But if not struggle and alienation, then how do they experience the tension, for certainly there are values that seem to conflict. They seem to cope with the tension by picking up additional identities without attempting to create a new, single assimilated identity from their multiple identities. They don't have an 'either-or' approach, one which implies an element of deracination. Their acquisition of engineering discourse is not at the cost of their cultural discourse. They are not the students about whom Bizzel writes she feels anxious, because she is "wiping out the students' own culture"(1982: 236). Being an engineer is but another one of their multiple identities that locks into the complex network of multiple identities. Their multiple identities remain intact. They are not smelted down in a great crucible of self.

There are however, student experiences of being an 'outsider'. There can be no doubt that Andiswa felt an outsider when she could not even double click the mouse, or Thandi when she compared her first assignment with those of the white students. Colin too, is an

outsider – on the politicized factory floor where he has to work. He discovers that the workers' think capitalism is evil, and that in terms of their beliefs he is an outsider.

It would seem that students professionalise their cultural knowledge – they use their cultural knowledge of how to work with people as an integral and definitive part of their professional knowledge. Lindiwe says of her being black (that is, of being different to the typical and/or traditional engineering student, of being an outsider) "that's the first thing that you can use so that you can gain everything". She makes an explicit link: "because I'm black, so I knew how to deal with older people". She does not experience her cultural knowledge and norms as conflicting with professional knowledge or norms – in fact they facilitate her professional performance.

Her difference from the dominant or traditional engineer is not something she tries to hide. In terms of Gee's theory it is precisely in an attempt to hide or deny signs of one's initial socialization that the source of alienation lies for non-mainstream learners not from the "mainstream" (Gee 1996:141). So where Gee's theory would have Lindiwe try to hide her difference and thus experience alienation, she does no such thing. She is a black woman engineer with no apology.

Pumeza also experiences tension between her professional values and her cultural values (telling the operators how to work in a way that will "save time, save costs or increase productivity"). When they resist her direction because she is young, she says "It is difficult especially in our culture cause you have to respect them – they are old". She experiences this not as an inner struggle, for she knows exactly what to do: In addition to her formal technical expertise she uses her cultural knowledge of showing respect to her elders. She is clear in her own mind: "he has to know that I have to do my work then at the same time, I'm respecting him". Not an either or approach. She is able to comply with the normative imperatives of both discourses without experiencing conflict. The individual is not a "site of struggle" where conflicting discourses wage war, but an agent acting on his or her own intentions.

Thandi, although less explicit about it, does the same thing. She believes that it would be unacceptable for her just to tell the workers how to change their performance for they have been there longer and feel they know better than she does what they are doing. She is careful to make them understand her reasoning rather than "force" them to do things her way, and so shows them the required respect. Colin has a different perception of respect. He believes people will co-operate with him if they "look up" to him. He links it to authority (rather than deference) and it is possibly the result of his privileged past.

Zayeed talks about challenge, about not complying - "rules are meant to be broken" - but he does not challenge the system, the "dominant Discourse" and its values and ways of doing things that Gee refers to (1996). Zayeed talks about challenging the system but gives no evidence of actually doing it. In fact, Zayeed shows that he too interlocks various identities without experiencing conflict. He finds a shared value (treating people with respect) in the discourses of his faith and his profession.

How are we to understand the way in which these students seem to comply without experiencing conflict or struggle referred to in the literature on writing and discourse theory? Much of the theory has been developed from research in composition courses or arts programmes (Bizzel 1982; Bartholomae 1988; Chiseri-Strater 1991; Flower 1994; Geisler 1994, Gee 1996; Ivanic 1997, Thesen 1997) – the experiences of these students occurred in every different context. Herrington (1985) whose research was in an engineering course makes much of students' identities and purpose in learning to write, but does not refer to conflict and alienation.

Craig (1996) argues that conflict is universally linked to change and cites such diverse instances as Piaget's claim that in the absence of conflict knowledge remains static, Marx's insight that a revolution was necessary for social change, and the trite pitches of sales people. Many arts programmes have as a central goal making students aware of the complex nature of reality, a goal which is likely to a engage students in conflict which affects them at a deep and personal level. Wancat and Oreovicz (1993) writing about learning in engineering, make a comparison between the intellectual and moral

development of engineering students and arts students on which Perry (1970) based his taxonomy. Perry had argued that on enrolment students see things as a simple duality, but as they progress they develop a more complex view in a process that involves dissonance or conflict. Wancat and Oreovicz found that "engineering students show little progress towards higher Perry levels and may actually regress slightly during their engineering studies" (1993: 272). Classes to students who are at the lower levels of development are usually presented "as if everything is known" (Wancat and Oreovitcz 1993: 272). This is different to the type of student experience documented in research in the arts and humanities. A participant in Liebowitz 's study of learning and writing in first year history at a South African university describes her experience of dissonance when she becomes aware of the complexity of the subject:

> What I feel distressing about history is because of the different opinions that there is on specific events. Like the French revolution where there are different interpretations. Mostly the interpretations confuse me and therefore I am unable to make my own conclusions.
>
> (Liebowitz 1995:123)

Wancat and Oreovicz's comment about the engineering student remaining at lower Perry levels raises the issue of how the students perceive and experience knowledge and knowing – an issue which also formed part of the general description and to which I return later.

So where my theoretical understanding of discourse acquisition includes conflict and struggle, I find that for these six students there is difficulty, but not struggle.

In trying to understand their experience as they experience it not as theory describes it, I go back to the concept of *lebenswelt*. Each student's experience is inextricably linked to his or her perception of world, which can be known in various dimensions (Van den Berg 1972, Spinelli 1989). It is only through the *lebenswelt* that we can access or understand what they experience.

Gee's account of how conflict and alienation occur is linked to or located within a particular single social order, and premised on the belief that all people in that social order will experience it in the same way. From a phenomenological view a social order is experienced as part of *mitwelt* and *überwelt* - two of the dimensions of *lebenswelt* (Spinelli 1989:128) and it will thus be experienced uniquely by individuals.

As a phenomenologist I would argue that context or social order (partly constituting the *mitwelt* and *überwelt* of the individual) make a significant difference to how the individual experiences things – in this case acquiring the discourse of engineering. Gee locates his theory in, and very clearly links the students experience of alienation and conflict to a particular social order:

> Quite obviously in a *society like the US*, where there is so much mobility, diffuse class and (sub-) cultural borders, class ambiguity and so many attempts to deny, change, or otherwise hide one's initial socialization if it was not 'mainstream' enough, there are many complexities around the notion of primary Discourse and many problems in tracing its fate through individual lives. Indeed, these problems are a difficulty not just for scholars studying these matters: the large amount of anomie, alienation and worry about 'self' and 'identity' in *the US and related societies* has its roots in these very problems
>
> (my emphasis Gee 1996:141)

According to Gee, what triggers the experience of alienation or conflict is an attempt by a socially mobile individual to "hide" or "deny" aspects of initial socialization that do not fit with the 'mainstream'. He links it explicitly to a specific social context: "in a society like the US". In another context it may well not happen. From a phenomenological point of view, even individuals within the specified social context will certainly experience it differently.

Thesen (1997) writing in a South African context believes that we may need to reconceptualise what we regard as mainstream. She argues that in contemporary South African higher education there is no longer clarity or certainty about what is 'mainstream'. Student demographics have changed significantly over the past decade

and in many cases white middle-class students are no longer the majority. Curriculums also have changed to reflect the needs and values of the majority of the people rather than the privileged white minority. I cannot here engage in a discussion of whether the discourse of a particular discipline has changed or not but a significant change in student profile, slow change in staff profile, statutory institutional forums to oversee the transformation of higher education institutions, and changes to curriculum values and content would all affect discourses. Discourse are not static, but are changed from within, by the people in them.

The students are more confident about their identities as blacks and women than what Gee suggests. They are confident about who they are and don't attempt to "hide" or "deny" their identities or initial socialization, so they experience no alienation or conflict. Thandi does not experience shame but amazement on seeing the difference between her assignment and those of the 'mainstream' white students.

The society and time they live in is one of great change at all levels. What is mainstream is being redefined – largely through powerful equity legislation in which black and woman are two "designated groups" (South Africa 1998). The black women in this study are thus doubly designated and possibly more valued in higher education and the labour market than black women are elsewhere in the world, and certainly than what they would have been ten years ago in South Africa. We live in a society which is changing fast, and the sense of stability, of 'establishment' that there may be in European or US societies which may incline people to deny or hide their initial socialization if it does not fir the mainstream, is not experienced by the students. This social order is six years old. That black women are the majority in the graduating class is indicative of the transition in society: ten years ago it would have been quite remarkable for a black woman to make it to the graduating class.

Gee's qualification links the experience of anomie and alienation to societies such as the US: It is "quite obvious in society like the US' and "in US and related states" (1996: 141). What my findings show differs from what he says of those societies. We may

need to work more carefully with theories developed and linked to social orders different to ours.

6.3.6 Knowing

The students' perceptions of knowledge inform their experiences of knowing. Knowing is experienced either as a state of possessing a commodity (knowledge), or as a state of being or doing. While knowing is a defining aspect of themselves as students, it seems that different students know different things in different ways. Knowing is thus not a one dimensional single thing, but a complex and varied experience. Some students' experiences of knowing differs significantly from the way in which knowing is described in social constructivist theories.

Zayeed's experience of knowing is as possessing a commodity, and he uses the term knowledge interchangeably with information. He talks about "collecting all the knowledge" as well as "collect(ing) information" as the first stage in writing. He refers to his collection of previous years' class notes as his "background knowledge" which he stores in his room and lends to friends on condition they return it. He believes "you change because you acquire knowledge". Knowledge is something that exists independently of him, that is acquired and collected.

Such a commodity perception of knowledge has significant implications for how a student perceives (and experiences) writing. Although I discuss writing in depth in the following chapter, I want to establish a link between the experience of knowing and the experience of writing here. If knowing is regarded as having (or getting) a commodity (knowledge) from the Internet/books/other people to offer to the lecturers for assessment purposes, then writing becomes a transaction very much like trade: "Here's the information – what's it worth".

How students experience knowing and what they do with knowledge determines whether they are fluent in the discourse – in Gee's terms "literate" (1996:143) – or not. It

also influences how they perceive writing. As writing is usually the preferred manifestation of discourse mastery for assessment in higher education, there is a three-way link between knowledge-writing-discourse in the context of this study. This three-way link is evident also from the manner in which the students' experiences of knowing affects their writing.

As long as students believe that knowing is about having information (knowledge) they will write in a particular way. Geisler (1994: 92) in her account of the development of rhetorical awareness in academic writing argues that for most under-graduates writing is only about content. That is how they were schooled for twelve years. Only at third year level (what she refers to as graduate school) do students start to develop rhetorical awareness. Once such awareness is developed the student writers reconceive texts so that meta-discourse matters: writing becomes doing something with text (not trading information for marks). This leads to a process of "rhetorical recovery" in which students discover the temporal and human aspects of indigenous culture, "the details of lived experience" they once thought they had to leave behind when engaging in academic discourse (1994: 92).

This dichotomy between knowledge valued in higher education and common sense knowledge is illustrated in the hierarchy of knowledge developed by Collins (in Power 2000). "Cultural skills" a form of common sense knowledge, are placed at the lowest level, and knowledge of "facts and rules" typical high levels of formal education at the highest level. (Collins in Power 2000: 159). Such a taxonomy of knowledge is familiar in higher education – certain types of knowledge are privileged, others better left at home. My data show that the students do not make such a taxonomic distinction: they bring and use their home knowledge in the discourse of engineering. Pumeza talking of how she interacts with older men in the factory, says: "You have to tell him that you have been to the Technikon and you know what you are talking about. And at the same time you know that you have to compose that message in a way that he'll know that you are informing him and at the same time you are respecting him". A marriage of technology and tradition. She values both knowledges equally.

Although knowing as having information is a dominant experience for Zayeed, which leads to his perception of writing being useful ("because I mean, you write out all the facts…"), there is evidence in the data also of a different experience of knowing and writing. Students experience knowing as a means for gaining understanding or negotiating meaning, for appropriating values and attitudes, for establishing identity and authority. This is the kind of knowing Emig has in mind when she refers to "writing as a unique mode of learning" (1997: 122). But this perception of writing only becomes possible if knowing is experienced as doing or being – not as having or getting a commodity.

Colin refers to knowledge as a means for establishing his credibility or status, and it is a source of his confidence. He experiences knowing as being or doing. In fact, he offers substitutes for doing the same things. For example, he believes that putting a spin on things, can be used as an alternative to knowing for impressing others (establishing his credibility or status). He believes ideas are more important than inert knowledge. His experience of knowing is not of getting knowledge - if he wants to get knowledge (information) he phones someone else.

Lindiwe makes a distinction between two types of knowing that result from the two locations in which she learns – the classroom and industry. In industry she experiences knowing as a way of being. "You experience it you feel it. You know how it is". Lindiwe's experience of knowing illustrates the very personal nature of knowing – a point argued by Polanyi at a time when interpretive research approaches were in their infancy: "Into every act of knowing there enters a passionate contribution of the person knowing what is being known, …this coefficient is no mere imperfection but a vital component of his knowledge (Polanyi in Emig 1977: 126). Such a view differs significantly from the notion of objective knowledge traditionally associated with the natural sciences and engineering. Polanyi's argument that the "contribution of the person knowing" is "a vital component" is significant. It is not a "mere imperfection" that

prevents us from all knowing things in the same way, from attaining a state in which we all possess the same objective knowledge.

Polanyi's view about the nature of knowing may also help us understand how the students experience tension between externally contradictory norms and values as a difficulty, but not as conflict, struggle or alienation. They do not attempt to know it as you know or as I know it. (Such a conceptualization of knowing while it would quite likely lead to struggle, is not tenable within a phenomenological view of the individual's subjective intentionality). They know it as a young black woman whose life prospects have been significantly changed by the recent repeal of apartheid legislation, or as a young Muslim man who infuses his engineering with the principles of his faith, or as a young white man who regards himself superior to black workers and who never wants to work alongside them again.

What then does Bartholomae mean when he says of students acquiring the discourse of higher education that "They must learn to speak our language" (1988: 273)? He refers not to language in a narrow linguistic sense, but to the broader sense of discourse which includes ways of doing and knowing. Does he mean they must know it as he knows it – which Polanyi would argue includes the "passionate contribution of (Bartholomae)". Bartholomae goes on to say that students must "know what I know and how I know what I know" (1988: 277). He is referring here to the epistemology of the discipline. The implication is that if we all know the same thing and know it in the same way (the "how I know it") we share a discourse. But he makes no mention of the "passionate contribution of the person knowing" that Polanyi refers to in the act of knowing. Bartholomae refers to the contribution of the epistemology to the knowledge – but not to the contribution of the knower as directly as does Polanyi.

Consider the various ways in which "knowing how to work with factory operators" is experienced by the students. Although this topic was covered in class (the knowledge is thus shared), and they all refer to the need to respect workers to get their co-operation, it is quite evident that their knowing differs. This difference is as a result of the "passionate

contribution of the person knowing". For Colin knowing this means doing things decisively so that the workers "look up to him", for Zayeed knowing this means incorporating a principle of faith into industrial relations, and for Pumeza and Lindiwe knowing this means deferring to men in the Xhosa tradition. They know their engineering discourse as the people they are. They do not suspend their other knowledge or identities in knowing engineering or being an engineer.

How they deal with the knowledge of working with factory operators also illustrates Cooper's point with which I prefaced chapter two: " the answers are not in the back of the book"(1990: 66). The answer to the question how to deal with this factory operator lies not in knowing the book, but in the way the individual draws on cultural knowledge to establish a relationship. Schön argues that if we regard "professional knowing" as being able to think like an (engineer), then knowing encompasses more than answers that can be given at the back of the book, but being able to reason appropriately also in "problematic instances" (1987: 39).

A writer has what Ivanic (1997: 24) calls an "autobiographical self" which includes cultural identity. Having established the link between writing and knowing, I would argue that this autobiographical self is also present in the knower, the person knowing. Their cultural knowledge is part of the "passionate contribution of the person knowing". Students are not cleansed of their cultural identities and cultural knowledge to become engineers - they become engineers with their cultural identities and their cultural knowledge intact. There is as Polanyi says no attempt to know things objectively – and thus no need to be cleansed or sanitized of their indigenous culture or everyday way of knowing. While Bizzel's view of teaching implies a unitary way of knowing, one which leaves the teacher feeling anxious for "wiping out the students' own culture" (1982a: 132), Polanyi's view of knowing accommodates the "passionate contribution of the person knowing". Bizzel's reference to wiping out the students own culture, calls to mind a subtractive model of multilingualism (Luckett 1995)- that is one where the additional languages are learnt at the cost of the first language, in which the first language is undermined. The students use their everyday knowledge as a base to which they add

technical knowledge without losing cultural knowledge in much the same way as an additive model of multilingualism proposes.

Acknowledging the contribution of the person in knowing is not the same as saying the person can know in any way. I argued in chapter two that in disciplinary discourse "not anything goes". They must acquire the engineering ways of knowing – as Pumeza does with *centroid*s. My findings indicate that they do use the conventions - including the epistemology - of the disciplinary discourse in their knowing. Pumeza's experience of discovering how to know the meaning of the term *centroid*s illustrates how both the person knowing and the convention contribute. The contribution of both the person knowing and the conventions of the discourse need to be recognized in understanding the students' experience of acquiring the discourse of engineering.

The person knowing has words and genres of other discourse which they do not forgo when they become engineers. Acquiring the discourse of engineering does not mean un-knowing other knowledge and discourses. From the findings it seems that students have an additive approach to discourse acquisition. They use their everyday cultural knowledge along with their technical knowledge. Gee (1996) talks about an individual participating in conflicting Discourses, about the possibility that the distance between the individual's primary and secondary Discourses is such that it makes access to the secondary Discourse difficult, and that this may result in conflict or alienation. My students don't experience this conflict.

Martin argues that scientific discourses are technical because science is concerned with building up an un-commonsense interpretation of the world (1993: 225) and that it is a fallacy to believe that students can learn science better when they learn it without the discourse, using only their own everyday words. Pumeza discovered the inadequacy of *centre of gravity* as a synonym for *centroid*s. Martin (1993) argues that science (engineering) has evolved words and genres that are suitable for scientific (engineering) knowledge. Students need the words and genres of engineering for knowing engineering. Pumeza's realization that *centroid*s is not just a synonym for *centre of gravity* illustrates

that "diluting scientific discourse necessarily involves diluting the science that is taught" (Martin 1993: 202).

Pumeza who says that she speaks Xhosa ("our language") most of the time prefers using English to learn engineering "cause I'm doing a scientific course. What would be a name for *centroid*s in Xhosa"? Having discovered the power of the words because of the discourse in which they are embedded, she chooses the language of engineering discourse (which in this case is English) to what she calls "our language" (which in this case is Xhosa). Andiswa has a similar experience – "learning in your own language is not very helpful because, the Technikon words, you can't use the Technikon words. You definitely won't understand what you are talking about." This is not only about the translation of words from English to Xhosa or vice versa (she does that - she thinks in Xhosa and speaks in English). This is far more – it is about the meaning of words as part of a discourse, not just as part of a language.

Polanyi refers to the what is being known as being constituted in part by the passionate contribution of the person, Martin refers to what is being known (the science) as being constituted in part by the words and the genres. But they don't exclude each other, and they don't necessarily lead to conflict. This person can use those words and his or her own words. Engineering knowledge and cultural knowledge exist parallel to each other and are used additively. The inner conflict and alienation described in discourse theory comes from a view which supposes that certain cultural discourses are incompatible with dominant or mainstream disciplinary discourses, and where in an attempt to conform, the students try to hide or deny their backgrounds. Such a supposition is qualified by Gee when he says "(q)uite obviously in a society like the US" where, because of the social mobility there are "many attempts to deny, change or otherwise hide one's initial socialization if it was not 'mainstream' enough" (1996: 141). In societies where - for whatever reason - people don't experience the need to hide, deny or change their initial socialization, the alienation may not necessarily follow.

Gee's reference to a non-mainstream student hiding or changing his or her initial

socialization implies that such a student experiences discourse acquisition as a process in which he or she must be cleansed of ordinary words and cultural knowledge before taking on the words and the knowledge of the discipline. That in conforming to the disciplinary discourse the non-mainstream student necessarily experiences alienation. The issue here is not whether Gee's argument is 'valid' or not. The issue here is clear: how do the students experience their discourse acquisition? My data do not show attempts to hide or deny their initial socialization.

This is a significant point in a phenomenological study - not to work with *a priori* beliefs or assumptions - no mater what their hegemony in the field. Not in this case to look for alienation and conflict because that is how theory describes it, but merely to listen and to understand what acquiring the discourse of engineering means to them.

In the previous chapter I prefaced my general statement with a reference from Polkinghorne: A general statement must enable the reader to "come away with the feeling that 'I understand better what it is like for someone to experience that'" (1989: 46). In this chapter where I discuss the findings it becomes clear that the students' experiences do not include the conflict or alienation found in theory. Although my purpose in this study is only to attain a better understanding of their experience of discourse acquisition, and not to critique or develop theory, their experience differs from theory in such a significant way that I am drawn to the question of why. Why is there no evidence in their experience of attempting to hide or deny their initial socialization?

To consider the question of there being no evidence in their experience of attempting to hide or deny their initial (non-mainstream) socialization is to be drawn to explaining. My purpose is to understand. And yet, my knowledge of the context in which their experiences are situated informs my understanding of their experiences and so I articulate it. If what follows seems like speculation it is not an attempt to explain, for that is not the purpose of this chapter, but an attempt to illuminate the context in which their experience occurs and so possibly to understand their experiences more clearly.

They are certainly aware of the difference between their initial socialization and 'the mainstream'. Thandi's amazement at white students' assignments is profound. Andiswa and Pumeza refer to Xhosa as "our language" in contrast to English, the classroom language, and describe how they use Xhosa in groups to facilitate their learning. Andiswa, despite using her language in group work adds that "it's not very helpful because you can't use the Technikon words". She makes no attempt to hide her language – although it certainly does not enjoy the same status as English does in higher education. If anything, Colin's change in accent when talking to black workers so as not to be seen as "high and mighty", is an attempt to hide his mainstream socialization.

The contemporary socio-political climate in South Africa is very different from that in "the US and in related societies" (Gee 1996: 142), particularly as regards the issue of mobility which Gee identifies as the cause of an individual's need to hide initial non-mainstream socialization. But where Gee regards this mobility and the "attempts to change" as an act of an individual within a stable society in which there is a clear and coherent mainstream, in South Africa the mobility and attempts to change are engineered by the state as it sets out to reconstruct society through legislation. Salient in this case is equity legislation relating to education and employment. The extent to which higher education institutions transform what constitutes mainstream is monitored by the Department of Education, (for redress in terms of admissions and policy) and the Department of Labour (for redress in terms of staff) (South Africa 1997 and 1998). In terms of the Employment Equity Act, all higher education institutions are required to submit bi-annual reports to the Director-General showing how staff profile is transforming from white male dominated to reflect the demographics of the general population.

The socio-political climate in South Africa may be in such flux that what was mainstream no longer enjoys the hegemony and power usually associated with mainstream. Thesen, researching student identity in the context of South African higher education says that critical discourse theory "assumes a coherent version of the 'mainstream' to which students aspire, which is not borne out in the interviews" (1997:

487). She argues that where in discourse theory writers such as Gee (1990), Kress (1989) and Fairclough (1992) use students from minority groups as subjects for discourse analysis and develop from there the notion of alienation, "this kind of analysis may be less useful in a South African setting because it is not possible in South Africa today to speak with the same certainty of a mainstream culture in general or with reference to universities in transition" (1997: 505). It is within this context of unusual mobility, this transition, that the students' experience of acquiring the discourse of engineering must be understood.

Students make a distinction between two types of knowing that result from the two sites of learning: Industry which leads to a "real" knowing, and formal classroom or textbook learning that leads at best to vicarious experience of knowing, and at worst, to memorization of information. Different places constitute different worlds and different ways of knowing – there is a clear difference in knowing vicariously and knowing really. I will discuss this further under sites of learning.

6.3.7 Being judged

Their awareness of being judged is prominent in their experience of acquiring the discourse of engineering. This is not unexpected for "assessment is at the heart of the student experience" (in Brown 1997: 7). Their sense of being judged is experienced both as formal (academic) assessment and in terms of establishing professional identity, or reputation. They feel judged primarily by their lecturers and the professionals they work with. In a different way and to a lesser extent they also experience being judged by non-academic non-professional persons or communities. Despite the pervasiveness of their experience of being judged, they do not feel judged by their peers. They rely on peers for academic, professional and affective support, but do not experience peers as a source of either negative or positive judgment.

Who they are judged by determines what is being judged and they are quite astute at figuring out what is on the agenda – even when it has not been made explicit. There is a

significant difference in how they experience judgment of their academic work and their professional performance.

I begin with a discussion of their experience of judgment as assessment. I have deliberately not used 'assessment as judgment' – a phrase more likely to be used in the literature on assessment, because 'judgment as assessment' better describes their experience. Formal assessment as encountered in theory has two purposes, a developmental and a judgmental purpose (Brown 1997: 9) from which come formative and summative evaluation.

The students experience little developmental assessment. Thandi says she looks at her mark but doesn't know where she went wrong, she experiences this form of assessment as final so there is no sense in trying to improve or learn from her mistakes. Colin also refers to the lack of feedback saying that remarks, when given are helpful to see where he went wrong. This experience of formal assessment has significant implications for how they perceive knowledge and knowing (previously discussed) and how they perceive writing (to be discussed in the next chapter). Their experience of assessment is as judgment, not as development, and it thus becomes separated from their learning. It is something they do to satisfy lecturers and it is not experienced as part of their learning. What the students get from assessment is marks. This is in stark contrast to the loftier possibilities one finds in the literature. Ramsden is willing to admit that in higher education there is a lot of "ineffective learning going on" and that it may include "the learning of an *imitation* of at least some of the discourse they are studying, a counterfeit amalgam of terminology, algorithms, unrelated facts, 'right answers', and manipulative skills that enables them to survive the process of assessment" (1992: 37).

In his criticism of assessment practices in higher education and the type of learning it encourages, Ramsden articulates a description of assessment close to what the students experience. They speak of lifting information from books without regard for task requirements or rhetorical engagement, of cutting and pasting from the Internet, of giving the lecturer the information he wants in the hope that it satisfies him regardless of their

understanding of it, of "repeat, repeat then it gets I my head and I write the test", of copying straight out of books – "like photocopying" – of doing it "just because you have to get marks, not for learning something out of it".

The result of this is as Thandi puts it, that "you can have marks, but you actually find out that you don't know what actually was happening. You just memorized", or as Ramsden says, that they are able to "survive the process of assessment". But the students are quite aware that this survival is short term and that to perform as engineers they need more. Awareness of the limitations of this approach is clearly articulated by Andiswa: "There's a problem because now I am preparing myself for employment, for my work. So I have to understand everything".

Although they experience formal assessment as a matter of survival – a bit of a scam even – they experience being judged in a professional context as more authentic and significant. They also value these judgments as indicators of their professionality, and the extent to which their credentials as engineers have been established. Colin says that although he felt awed when he got to East London to meet the plant managers in the boardroom, afterwards he "felt quite important" because "for the first time you are being recognized by a group of senior people". This captures what their experience of being judged in industry is all about – recognition.

As a writing teacher I regard writing to be a central manifestation of discourse acquisition, my data show that in the students' view writing may not be as central. They seem to regard non-writing aspects of their performance as more important indicators of their discourse acquisition and describe their experiences of being judged in contexts that do not include writing. Colin is aware of being judged by the managers when he works on a project in the East London plant. Pumeza is aware of being judged when all three managers attend her presentation and ask questions – not for their information but to see whether she "really knows what (she is) talking about", and Lindiwe describes the file embossed with her name and the company logo given to her by the manager and the response of the workers when she left as an indication of her value as engineer, "they

valued what I was doing so that in other words I was respected". These are significant experiences of being judged and from them the students are able to gain confidence as engineers, to become aware of their identities as engineers, and to receive confirmation of their compliance with engineering norms and procedures. This is a more significant and greater gain than the marks they get in formal assessment.

Although their awareness of discourse is often described without reference to writing, some writing is experienced as a manifestation of discourse. Lindiwe describes how she thinks about ways of writing the report to convince the managers "so that they can all see 'oh, this is really a problem'". Here she is using writing to perform her job and signal her identity as engineer.

Their experience of being judged extends also to non-academic and non-professional spheres which they relate to their performance as engineers. Zayeed's respect for workers is based on a principle of faith for, if he were not to follow this principle in practising engineering he faces judgment and punishment. Lindiwe knows that the workers judge her as "an informer" (a powerful political term in the South African context) and is aware of the social condemnation she faces from her community for taking action when workers come to work drunk. Thandi is aware of the reverence of her rural community who "give her wings' for what she has achieved. Whether students experience this judgment as positive or negative, they are not as affected by it as by professional judgment. Its significance lies in their mention of it. It indicates the pervasiveness of the sense of being judged - of having their behaviour pronounced upon, all the time, by everybody - as they acquire the discourse of engineering.

6.3.8 Making judgments

Judgment is used here in the sense of making a reasoned decision – it involves the individual making critical distinctions with substantiating grounds. It should not be taken

in a narrow sense to mean disapproving. There are two types of judgments they make – judgments of other people and engineering judgments.

When the function of this judging of others is considered it seems to be the result of their attempts to position themselves relative to others. This positioning of the self is done in terms of others, and this requires that they make distinctions; us-them, black-white, lecturer- student, engineer-student, man-woman. Judgment as positioning the self is a central tenant in a phenomenological conceptualization of self – it is a dimension identified by Binswanger as '*mitwelt*' (Spinelli 1989: 128), and by Van den Berg as self-and-others (1972: 31). Although in a phenomenological view "self-and-other" is not necessarily experienced as judgment, and not all their experiences of others can be typified as judgment, there is a clear sense of judgment in their relating of themselves to others.

Andiswa refers to the workers as 'them', and judges herself to be part of the 'we' which includes the company management. She elaborates by saying that the divide between us and them is the commitment to increasing company productivity. Such reference is judgmental and enables her to align herself clearly with the one group. There are various references also to black-white – made by both black and white students – which point to how acquiring the discourse of engineering differs for the two races. Colin says the pace is too slow, he has done the work at school before. Thandi refers to her amazement at the quality of the assignments the white students submit, and to the white students who don't experience the same distance between high school and first year. Lindiwe when referring fleetingly to students, adds that she means both black and white students. These references are significant in contemporary South Africa. They indicate that acquiring the discourse of engineering is a different experience for a black student to what it is for a white student, and that they - black and white - are aware of the different experiences of the other.

They also make judgments in the actual performance of their engineering tasks, and take responsibility for these judgments. Lindiwe has to deal with workers who are drunk on

the job. Despite being aware that her professional judgment will have personal social implications (she and the workers are part of the same community) she makes a sound professional judgment: "It was a safety hazard. … I had to stand up and say, 'this is wrong'". This is an unequivocal judgment - she does not seek a compromise. Colin talks in more general terms of being intolerant of people who don't do things the right way, saying that he has in fact become less tolerant of people. Pumeza describes how her experience of being able (allowed) to make decisions while in industry contributed to her being able to position herself as an engineer rather than a student in terms of the others in the department. Andiswa also judges the workers on professional grounds – she comments that their sitting around talking and drinking coffee is a problem because it wastes time. Making such judgments is how they position themselves in terms of others who are not engineers and so distinguish themselves as engineers.

These are real judgments that they make - again it is not a case of imagining how they would act if they were placed in a challenging professional situation. They are in a challenging professional situation. Barnes and Barnes (1990) argue that class assignments involving moral issues place students in a situation where they are expected to act as managers, and "internalise values and practices of managers, or at least of a social group to which they don't belong" (1990: 259). Lindiwe was able to judge the drunk workers because she had internalized the values and practices, and because she experienced a sense of belonging to the social group of engineers. This again points to the difference in experience brought about by the students' experience in industry. Much theory is premised on the assumption that the learning of writing, thinking and valuing occurs in a classroom. This is discussed further under sites of learning.

6.3.9 Imitating role-models

Their experiences of modeling or imitating role models are diverse – each student experiencing imitation differently. Colin is systematic and focused on observing successful engineers to copy what they do. Lindiwe actually avoids imitating people

directly but prefers figuring out from texts what somebody did in their construction. Andiswa is adamant that lecturers are too "advanced" and she thus prefers modeling from other students who will do something over and over with her until she grasps it. Zayeed is quite explicit that Mohamed is his role model, and Pumeza names a lecturer as her role model. Thandi resists modeling herself or her action on others. She only concedes that the student who wanted to show her how to draw a straight line was right after her own way proved inadequate. Some of what they experience fits with how modeling and imitation are described in theory – but other aspects differ.

The students did not acquire the discourse of engineering only from engineers (academic or professional) a substantial portion of their engineering discourse was acquired from their peers.

Vygotsky's (1978) construct of the zone of proximal development (ZPD) is an account of the manner in which individuals are enabled, through the help of another, to go beyond what they can do on their own. He defines the ZPD as the difference between what individuals can do on their own and what they can do with the help of another – this other may well be a "more capable peer" (1978: 86). Andiswa is explicit in her preference for working with peers as she seems intimidated by lecturers. Vygotsky affords capable peers the same ability to help an individual as he does an adult. (1978: 86) Although Vygotsky was writing about children learning, his ZPD construct can be extended to apply to students learning engineering from lecturers or professionals (the equivalent of adults in the ZPD) and more capable peers. He argues that although imitation is what enables the individual to move on to more advanced levels of problem solving, it is useful only if it lies within the individual's ZPD, and not too far beyond (1978: 88). This is what Andiswa experienced when she says the lecturers were "more advanced" and that she learns better from her peers.

Discourse theorists however, emphasize the need for masters (academics and professionals) to model, to make explicit the discourse of the discipline. Colin, who does not rely on the overt help of others in the same way as Andiswa does, imitates at a

distance by observing and copying what successful people do. His experience is similar to that described as a cognitive apprenticeship by Flower (1994) and Rogoff (1990).

Discourse theorists who subscribe to a social constructivist view of knowing and learning, also acknowledge the importance of the other in the development of an individual, but the other is usually specified as a master rather than just a more capable peer. This may be a matter of degree – for what is a master if not more capable? It is in the degree of greater capability that the difference between a peer and a master lies: a more capable peer need not be a master.

This seems to be a minor point of difference with theory – that students learn much of their professional discourse from more capable peers, not from masters or professionals. A first year does not learn from a second year, but from other first years who seem to be more capable. More capable is not necessarily defined in terms of their mastery of engineering discourse as such, but rather in terms of their initial socialization, or primary Discourse. Students are drawing on the initial socialization, or Primary Discourse of other students to facilitate their acquisition of engineering discourse. Women draw from men because they were exposed to more technical stuff as boys, blacks draw from whites because they were exposed to assignment writing at school. The professionals may not have a monopoly on modeling of professional discourse – there are numerous contributing aspects which students model on their peers.

Does what they model from peers constitute peripheral knowledge, or knowledge that is not unique to the field - like using a computer, drawing a straight line free hand or with a T- square, typing and presenting an assignment appropriately? As a final year student Andiswa is using sophisticated CAD programmes. But her mastery of CAD is dependent on being able to do basic things on a computer like double clicking the mouse or bolding text, which she says she could not do in her first year, but learnt from her peers. Just as the decontextualised ability to use a CAD programme does not make one an engineer although it contributes to the whole of what and how an engineer can do things, so being able to draw with a T square or use a computer also contributes. Is learning to

use a computer any less part of the acquisition of engineer discourse than learning to value productivity? But if one argues that learning to use a computer is not part of acquiring the discourse of engineering, one is separating and decontextualising skills, and working with an autonomous, discrete item approach in which the whole is no more than the sum of the decontextualised parts. A discourse is a whole and very definitely contextualised. I would argue that learning to use a computer is as much part of acquiring the discourse of engineering as is learning to design things. Furthermore, that designing things on computer is done in terms of certain values (for example, productivity) and constraints (for example, strengths of material). So Andiswa's experience of learning how to use a computer is as much part of acquiring the discourse of engineering as any of the other student experiences.

If it is something they learn or acquire in the course of their formal programme and it is used in performing the job of an engineer then it is part of the phenomenon investigated in this study. I would thus argue that they acquire the discourse of engineering by frequent modeling on what peers (non-professionals) do. There are explicit references to lecturers not modeling – Andiswa's experience of the computer lecturer telling her to "click the B" and her drawing lecturer telling her to make a freehand drawing. Zayeed's experience of being shown completed assignments and being told that that was how he would have to write. Thandi's experience of being told but not shown how to write an introduction and conclusion which left her feeling that she didn't know "what is actually needed". When lecturers neglect to model things the students turn to peers. Students experience the modeling that peers provide as a significant contribution to their discourse acquisition: Andiswa learns to draw freehand and that she must type her assignment, Thandi learns to use a T-square and to present her assignment in a plastic file. Zayeed learns about what techniques are practiced in industry from the others in his group.

Students also model on what lecturers say and do. Lindiwe refers to lecturers sharing their industry experience. Pumeza models filling in time sheets on what her lecturer does but discovers another way of doing it in industry. She understands the second way but

declares it "is not appropriate for me" and chooses to follow her lecturer's approach. She is not uncritical in her modeling though, and explains that when faced with two different models she sometimes draws from each to develop her own way. She is guided by the modeling but does not feel compelled to follow. By figuring out her own third way she seems to indicate that she too has authority, that she need not copy but can use the modeling to guide her own doing.

I want to highlight their experiences of modeling their writing by way of supporting what I say in the following chapter about their understanding of what writing is, and what they do when they write.

The students' experience of modeling is not centred around what someone does when they write, but described in terms of the logbook (a weekly log of what they do in industry which also contains a guide for writing the final report of their industry experience), or completed texts. Ironically, in industry the process of copying the completed product of a competitor rather than developing it for oneself is referred to as 'reverse engineering'. Their experience of modeling is of looking at finished texts (things) and setting about copying those, not of looking at the social function of the text within the discourse community, nor of looking at the what a writer does (action) and copying that. Flower's pedagogy is built around the expert writer modeling the writing process – including the cognitive processes - for the novice. These students don't observe the process, they just reverse engineer from the completed product.

Their experience of imitating texts rather than people serves to further illustrate their perception of academic writing as typed words on a page rather than "doing something with text" (Geisler 1994) or "literate acts" (Flower 1994) or as Bazerman and Paradis propose, a view in which texts "consolidate professional interests, enroll novices into professions, and direct human activity with far-ranging social consequences" (1991:10). The significance of this conception of text for how they approach their writing is discussed further in the following chapter. Modeling is an explicit aspect of process

pedagogies and implicit also in initiation theories of writing. In all of these pedagogies the student models on what the teacher (or a peer) does or makes explicit.

> when a student (or any writer) successfully learns something about writing by imitation, it is by imitating another *person*, and not a text or process. Writers learn to write by imitating other writers, by trying to act like writers they respect. The forms, texts, processes are in themselves less important as models to be imitated than the personalities, or identities of the writers who produce them.
>
> (Brooke in Ivanic 1997:85)

But what do these engineering students do? They model their writing on other texts not on processes or people. In their experience it is precisely the forms and the texts that are modeled. Andiswa uses a book "to show me the format of the report, how to write it", and Lindiwe uses the logbook, "the logbook tells you what the report must be and what is required". Their focus is on the text, the product, rather than the process of writing, or the action of the writer. There are frequent references to modeling the format of a text – it must have an introduction, a summary, a conclusion, a contents page, a reference list. They are all familiar with the format but as Andiswa and Thandi say, they don't actually know what to do.

The pedagogies in which students are taught to model their writing on an exemplary text or product, rather than the process (be it cognitive or social) have been in decline since the seventies. It would appear however, that students experience product modeling rather than process or writer modeling in their engineering subjects.

Colin, who refers to modeling his behaviour on his mentor and successful professionals in other respects, says of his writing that he will ask a secretary if he needs help. This is significant as it illustrates how separate writing is from engineering practice in their experience. When he does refer to a person, it is to a secretary, not to an engineer.

Their experience of modeling is far from the description Flower gives in which the teacher models cognitive processes, coaches, scaffolds and then fades out. She equates

modeling with a "cognitive apprenticeship" which involves more than observation as is the case in an ordinary apprenticeship. The teacher actually needs to "externalize the thinking processes associated with planning, invention, self-monitoring, diagnosis, self-correction and other key moves" (1994:119). Zayeed's experience of the modeling that the lecturer provided was of being shown reports written by final year students and being told that this is how he would have to write. There was no thinking process externalized for him to observe. Thandi's experience of modeling consists of being told what sections an assignment must have. This happened in her second year – almost as an after thought when the lecturer realised that they "really have no clue". This is not modeling as meant by writing theorists (be they cognitivists or social constructivists).

Based on her research in an engineer course, Herrington argues that writing can only function as a way of introducing students to thinking and acting within a discipline if the context, purpose and audience are appropriate (1985: 354). Not all academic writing serves the function of initiation into the discourse, one of the three "textual dynamics" identified by Bazerman and Paradis (1991). They are initiated also in other ways. They write also for other purposes. So if their modeling differs from that described in writing theory, it may be because they experience their initiation into the discourse of engineering occurring in other non-writing ways.

6.3.10 A man's world

The women all commented on their experience of engineering as being a man's world: Lindiwe is aware of other peoples' perceptions that as a black woman engineer she is "very out". Andiswa feels that the lecturers don't realise e that her initial socialization did not include the exposure to technical things that the men's did. Pumeza feels doubted by other engineers in industry who are a bit wary of a woman engineer and feels that her dealings with the workers are also complicated by her being a woman. Thandi's experience of being wolf whistled at on her first day exacerbated her anxiety about not knowing what to expect. These are different manifestations of the same experience – that being an engineer and acquiring the discourse of engineer is different for a woman from

what it is for a man. The fact that neither of the men commented on his experience in terms of being a man resonates aptly: it just is not an issue for a man.

Although the women form the majority (by one) in the final year class, in previous years they have been a minority[25]. But it is not in the context of the classroom that they comment on their experience of being women. Although Andiswa refers to her lack of technical exposure as a girl compared to that of boys, she actually prefers working with men. Although Pumeza likes having the women majority in class in her final year because it is more open, she has no problem with working with men in class. Nor does this awareness seem to come from within themselves. They experience the difference – of being women – only in industry where the experience or awareness is imposed on them by men.

The difference they experience seems to lie in expectations. To them there is nothing strange about wanting to be an engineer, but men (workers and other engineers) seem to expect that women are not engineers.

Thandi's experience of being wolf whistled at makes this clear – they were not used to a woman engineer. She was anxious because she was in a new situation and did not know what to expect. Although their whistling compounded her anxiety, she did not experience anxiety about being a woman, or anticipate their reaction. Pumeza experiences her being a woman engineer as something quite unremarkable and is surprised and mildly affronted that the men should have any qualms about a woman being an engineer. Lindiwe makes the difference in expectations explicit – she laughs when describing that "… a woman as an engineer, it's something they don't want to deal with - especially men". It's not her problem, they are the ones who find her "very out". She does not experience being very out. In the experiences of Thandi, Pumeza and Lindiwe it becomes clear that although they are aware of other people's expectations that engineers are men, they are quite comfortable with being women engineers. They are

[25] Cf Wancat and Oreovicz (1993: 2) who note a downward trend in the enrolments of white male 18 year olds in engineering programmes in the US.

unperturbed, they find it unremarkable that a woman should be an engineer and they get on with becoming one. In their experience the body is not an anatomical destiny, but "one's primary location in the world, one's primary situation in reality" (Moore in White 1997: 105).

Their experiences of themselves as women acquiring the discourse of engineer is personal – there seems to be no evidence of their experiences having political or social overtones. They are women; they want to be engineers; others find this unusual; they don't.

Andiswa is the only one to describe her experience in terms of disadvantage – but this too, I believe remains at a personal level. Andiswa's whole experience of acquiring the discourse of engineer is infused with a feeling of disadvantage, she refers to feeling inferior or disadvantaged in other contexts too. Furthermore, her response to feeling disadvantaged compared to the men is to make sure that she works with the men to learn from them the technical background she feels she lacks.

So although they are aware of the difference of their experience, it is not experienced as a restriction or a limitation in any way. Their being black women who must defer to men also does not limit or restrict them. They feel quite able to comply with that cultural requirement without it interfering with their becoming engineers. It places additional responsibility on them, it entails doing their work in a particular way (respectfully) but it does not prevent them from becoming engineers. If a practice is "what people do in response to the demands of social interaction" (Cooper 1990: 73) then this is what black women do in response to the demands of the social interaction of engineering.

6.3.11 Sites of learning

Their experience of where they are affects their learning and writing in significant ways. They differentiate between being in the classroom and being in industry. Lindiwe links this distinction of location to her experience of who she is, " when I'm in class I feel like

a student but when I'm at work, that's when I feel like an engineer". Her change of identities is palpable when she says she stands before her examiners (lecturers) as a student who is "nothing", although she knows she knows more about her industry experience than they do. The two locations are separate and they affect her experiences of learning and being. Lindiwe articulates this more explicitly than the others, but the same experience of being a student in the classroom and an engineer in industry, and the same differentiation between the learning and writing that occurs in each is evident in the descriptions of all but Zayeed. Zayeed is the only student who has not yet been to industry. His only experience of acquiring the discourse of engineer has been in the classroom.

Colin makes the distinction in his experience explicit – he feels that he has learnt more "out there". The distinction is implicit in Andiswa's experience. She feels insecure in class, but is assertive in industry (she does not hesitate to make pronouncements on what the workers do, or refer to any insecurity she feels). Pumeza describes how she needs to know things differently in industry and class, how procedures are performed differently in industry from the way they are described in class, and how her experience in industry has deepened her understanding of her class work. Thandi is also very explicit about the difference which she experiences in terms of learning. She says industry is different because "you are actually doing it - you do it, you are in the work place, like it's not a question". What she comes up with (writes) is all from her, not taken from another source. Thandi, like Lindiwe makes a distinction between the vicarious way of knowing in the classroom, and the real or first hand way of knowing in industry. She says that although they were taught things in class, she believes that "they'll have to teach you again in industry what to do".

The difference in ways of knowing also has implications for writing. In the classroom they know vicariously, learn by memorization, and write by copying and shifting information. In industry they know directly, learn by doing and write by transforming knowledge. (Knowing has been discussed previously, and writing is to be discussed again in the next chapter).

The students' experiences of learning in industry go further even than the learning Schön advocates in a "practicum"(1987). A practicum is "a setting designed for the task of learning a practice. In a context that approximates a practice world, students learn by doing, although their doing usually falls short of real-world work"(1987: 37), these students experience real-world work. Schön goes on to argue that if professional knowledge is regarded as "thinking like a …" this type of learning is essential (1987: 39). It entails far more than a well-stocked repository of professional facts. This is in line with Gee's notion of a performance within a Discourse (1996) and Geisler's notion of the dual problem spaces of expertise (1994). While few professionals are likely to suggest that professional knowledge is limited to facts, theories and techniques, classroom practices lend themselves to a view of professional competence as the application of theories and techniques in solving instrumental problems. Classrooms may be efficient places for teaching theory and techniques, even application, but students learn more than what is taught in the classroom when acquiring the discourse of engineering.

In writing theory it is assumed that the learning to write occurs in a classroom. Although novice writers are made aware of context, audience and purpose, such awareness is practiced as imagination. They are required to vary in their imaginations the contexts, audiences and purposes. But no matter how well the students manage to <u>imagine</u> different contexts, audiences and purposes they also <u>know</u> the actual context is always the classroom, the actual audience is always the lecturer, the actual purpose is always to get marks. In some writing pedagogies the focus is purpose and audience (Odell 1980, Flower 1994), in others the focus is on context (Bizzel 1982a, Bartholomae 1988). There is not much sense in my describing the relative merits of the different writing pedagogies (or critiquing the one in terms of the other). My responsibility at this stage is to discuss the findings, and any reference to writing theories must be in that context.

What becomes significant when writing theories are considered in that context, is that students experience their writing as having a different purpose, being read by a different

audience and occurring in a different context. The difference hinges around where they are: in industry or in the classroom. Their experience of writing during their two semesters of experiential learning is different from their experience of classroom writing (assignments). Barnes and Barnes argue that students write to get good grades and that student writing is "qualitatively different from real writing" (1990: 57). Christie's notion of "curriculum genres" used "in order that people may be educated" (1991: 237), and John's distinction between "classroom genres" (for assessment purposes) and "authentic genres (texts that serve communicative purposes among experts)" (1995: 277), make the same point. Classroom writing is qualitatively different because it is not authentic. Students know that it is a display to satisfy the lecturers. They write for marks and not as part of the practice of their profession.

As I have previously shown, academic writing theories imply that students need to imagine being somebody other than a student. The students in this study experience being engineers, and are thus not as dependent on imagination when they write. They do not image that they are engineers. They write either as a student (in the case of assignments) or as an engineer (in the case of reports). This is a crucial distinction in their experience of acquisition the discourse of engineering - one brought about in part by the two sites in which they learn.

In research on writing in engineering classrooms (Herrington 1985, Mathes and Stevenson 1976) and research on non-academic writing (Odell and Goswami 1982, Selzer 1983), the emphasis is on how the difference in context, purpose and audience affect the writing. Students experience their academic (assignments) and professional (report) writing differently. They differ in terms of context (where and who they are) purpose and audience. . When the students write they do not imagine being an engineer writing to an imaginary superior in an imaginary company. The are an engineer writing to a superior in a real company about a real project involving real workers (and as Colin pointed out, real money). Or they write as students for a lecturer in a classroom. They write either as the one or the other – they do not write as students imagining or assuming the role of engineer.

As my methodology requires, I side neither with Bizzel (1982) or Bazerman (1981) who place context at the centre, nor with Flower (1994) or Odell (1980) who place process (audience and purpose) at the centre. I am interested in how these six students experience it, and their experiences differ from both theoretical schools on the need to imagine. To them it is not about being in a classroom and imagining a particular context, or audience and purpose, it is about actually being in a different context, with a different audience and a different purpose.

Herrington (1985) attempted to establish what function writing serves in a course, and "how writing assignments introduce students to intellectual activities, social roles and purposes for writing that are important within a given discipline" (1985: 331). She examined the writing students do in two "forums" or contexts – both classrooms, but significantly different. The one, a "lab" course, is a typical academic setting, the other, a design course, is an industry simulation. Herrington's work is insightful – it acknowledges that who the students are when they write, what they perceive their purpose to be, and who the reader is, all affect their writing in significant ways. It shows that students are aware of who they are when they write, and of who they are writing to. Thus the writing they do as engineers is different from the writing they do as students. Although her work is significant in pointing out these differences in how the students experience their writing, ultimately the design class for all its difference from the lab class, remains a simulation. And simulations are not quite authentic either.

Herrington points out that for students the purpose of writing is usually to "demonstrate knowledge", while in engineering it is to inform or convince engineers and non-engineers (1985: 305). Odell and Goswami make the same point: The writer's sense of relationship with the reader must be considered in writing research (1982: 201). Where writing research is based on writing generated for classroom, assessment or research purposes, it may differ significantly from the writing done for other 'real' purposes. Students are aware that the audience of their writing (lecturer) is not using the text for instrumental purposes but to evaluate them. Berkenkotter, Huckin and Ackerman (1991)

researching discourse acquisition in graduate students noted that the complexity of moves a writer makes in an introduction is affected in part by "whether the writer composes in a professional or training (university) context" (1991: 196).

6.3.12 Ideology

Students subscribe to a great diversity of ideologies; in addition to the professional ideology of efficiency, there is capitalism (Colin), Islam (Zayeed), and a traditional Xhosa deference to men and elders, as well as pragmatism (among the women). Ideology is used in a broad sense here, much as Gee uses it. He defines ideology (after wisely qualifying it as a "socially contested term" and providing a list of references to other writers), as "social theory which involves generalizations (beliefs, claims) about the way (s) in which goods are distributed in society" (1996: 21). He adds that the claims of distribution can be either direct or implied, and that goods are what society generally believes are beneficial to have, including life, space, time, jobs, status, power, and schools.

As it is widely accepted that education is ideological and not neutral, it should not be of great significance that there is an ideological dimension to the students' experiences of their discourse acquisition. Nor is industrial engineering a neutral objective science, devoid of ideology. Students referred to ideologically motivated tasks they do in performing their jobs: "improving productivity", "making better", "changing the way they work". Such statements when made by industrial engineers about what they do, are underpinned by a belief that increased productivity is a good that is beneficial to have (at least for the company).

If both education and engineering are ideological the mention of ideological experiences as they acquire the discourse of engineering should not in itself warrant discussion. What may be significant and worth discussing - particularly in the context of South African higher education - is the lack of conflict among the students' very different personal ideologies and between their personal ideologies and the professional ideologies of

engineering. What follows should be understood in terms of the preceding discussion of conflict.

The students make professional judgments implying an ideological stance expected of an industrial engineer (for example moving a worker to another machine as she is slow, or that chatting and drinking coffee is a waste of time) without seeming to experience any tension or conflict with their personal ideologies. Colin is the only one whose personal ideologies (efficiency and capitalism) seem clearly aligned with the ideology of industrial engineering (efficiency and productivity). The others refer to cultural traditions that are underpinned by ideologies that may well be at cross purposes with the ideology of efficiency that underpins industrial engineering.

Andiswa is matter of fact about saying their talking is a waste of time – she makes no reference to the shared belief that politeness (in the form of a certain type of small talk) is one of the goods valued in black communities (more so than in white communities, or in industrial settings).

Zayeed's Islamic ideology is also that of a minority. He refers to the possibility that other people may not see the overlap between Islam and engineering, but to him it is obvious. He feels that he may be the one to make it explicit to others. ("Why hasn't anybody come forward with this? I made the connection… maybe I'm the person to bring it up"). Where from an outside perspective some tension or conflict may seem likely, in Zayeed's experience there is none. Zayeed establishes <u>connections</u> between the ideologies of seemingly unrelated discourses. This is his experience, and it is different from the experience of <u>conflict</u> implicitor explicit in discourse theory (Gee 1996:145).

By accepting their cultural responsibility to defer to men (and their elders) the women are participating in a particular discourse, and displaying allegiance to its ideology. When they tell men (or their elders) to change the way they operate, or act against them for being drunk, or talk about having power over them, they are participating in a different discourse, and displaying allegiance to a different ideology. Lindiwe and Pumeza

experience this as a social difficulty which demands great social skill, but it is never experience as an ideological conflict. Gee refers to "conflict between Discourses and within individuals while they use certain Discourses" and argues "we can always ask about how much tension or conflict is present between any two of a person's Discourses. I (Gee) have argued above that some degree of conflict and tension … will almost always be present" (1996: 145). In a phenomenological study, I do not ask how much conflict is present for I do not hold the supposition that there is conflict (or any other supposition). I listen, suppositionless, to what my participants tell me. And having listened to what they tell me, Gee's question becomes meaningless. The women do not experience the two ideologies as conflicting – or irreconcilable – but as imposing social obligations on them that men would not experience. Nor do they buy into the ideologies of engineering at the cost of denying their community ideologies (for example, on the position of women). I have no doubt that they are sincerely committed to both ideologies – one gets the sense that they really believe in improving productivity and that they respect, rather than just show respect to older men.

Gee argues that discourses are inherently ideological (1996: 132), and furthermore that "it is of course a great advantage when any particularly secondary Discourse is compatible (in words, deeds and values) with your primary one" (1996: 142). If compatibility is a "great advantage", is Gee not implying that incompatibility could be a great disadvantage? Colin and Zayeed refer explicitly to experiencing compatibility between their primary discourse and engineering discourse. Colin shows that his primary discourse is an advantage when he says of unfamiliar terminology that he'll "ask (his) father". Zayeed says of his Muslim discourse that it connects with his engineering discourse. Lindiwe and Pumeza on the other hand, highlight their awareness of the incompatibility of their discourses. Pumeza says "you must shut up, and listen and heed whatever he says to you. So, now I'm in industry I have to tell them what to do – that's my job. So, that's when you have to create a relationship". She refers to the outward incompatibility between the discourses but not to inner conflict. Here is potential for conflict: having to shut-up, listen and heed what he says in terms of the one discourse, and having to tell him what to do in terms of the other. But Pumeza experiences it as an

indicator of how to act: create a relationship. And, as a young black woman she knows exactly how to relate towards him within this relationship: respectfully. She is thus able to show allegiance to two different 'conflicting' ideologies simultaneously. Nor is her allegiance to her primary Discourse experienced as a disadvantage. It would seem that she uses her primary Discourse to perform in a secondary Discourse.

It may be that they do not experience any tension or conflict between the different discourses. Or it may be that when participating in discourses with conflicting ideologies, they opt for a third, pragmatism. They do what is necessary in each discourse without considering themselves as disadvantaged.

But a phenomenological study does not attempt to establish whether these ideologies 'really' are compatible (or incompatible). If the students experience their personal ideologies as reconcilable or comparable with engineering ideology, then that is how it is for them. The purpose of this study is to understand their experiences of acquiring the discourse of engineering. It is not in the scope of this study to explain why they experience this compatibility (or to question whether they really experience compatibility). I have described and discussed what I have found – and it does not include conflict. Any attempt to explain it would be methodologically unsound.

6.3.13 Self and time

Students experience time as an awareness of past and future – often in comparison to the present. Their experience of the present is thus often described as a transition between past and future. Their experience of the present occurs at a time of significant social change. This social change needs to be noted if their experiences of their personal pasts and futures are to be understood. And yet, I am aware that as a white South African, I am poorly positioned to try to describe what the past may mean for a black South African.

A township or Transkei childhood would in most cases have been marked by poverty, limited education (particularly for girls), poor access to medical services, and a narrow

range of job prospects. (I make no extrapolations about happiness or quality of life – for I regard too highly the individual and the power of agency. Poverty or limited education does not determine the quality of one's life.) I think it safe to say that higher education and a professional career were not part of a black child's future.

Although the new social order in South Africa is only six years old, the legislative changes that have occurred in those six years have radically altered the possibilities available to some people. South Africans are possibly more aware of their sense of past and future than are people who live in an older or more stable social order. Our collective consciousness of the passing of time can be described in terms of the 1994 election: before and after. This collective consciousness is paralleled by a student's individual awareness or experience of higher education as transition: before and after.

Lindiwe makes her experience of past and future as transition quite explicit: "I know where I came from, I know what it means to be here to me, … I have something to look forward to". What is not as explicit, but referred to nonetheless, is an experience also of the higher education as the means whereby she moves from her apartheid past to her professional future. She says she is "very lucky, because some people didn't get this far". Andiswa makes a similar, implicit reference – her past is linked to her awareness of deficiency and disadvantage, but her future to capability – for example, because she will need to express herself well as an engineer, she has learnt to do this. She has given up memorizing, but seeks to understand because she will need to as an engineer. Pumeza, Thandi and Colin all have a strong and positive awareness of their futures: Pumeza links her current "professional side" to "what I'll be doing in five years time"; Thandi experiences her present in terms of her future: " In future I'm this person, so I might as well start practicing now". Where Thandi takes the future to the present, Colin takes the present to the future: he deliberately acts in the present in a way that will give him maximum advantage in the future. They experience the present as a transition between their pasts and futures.

Higher education is often described as a period of personal transition in the literature. Ivanic links transition to identity when she says, "They are at a critical time in their lives, ostensibly re-categorizing themselves as adults-with-higher-education …" (1998: 14) Although she was writing with particular reference to mature students who would have been 'adults-without-higher-education', it is no less true of regular aged students, particularly in the South African context where for black children, becoming an adult was not associated with higher education. Higher education enables them to re-categorize themselves: as adults and engineers. The experience of a black youth becoming an adult with higher education may be similar to that of mature students entering higher education. Both are 'non-traditional' students. It just was not a part of their life plan in adolescence, and they may, as Ivanic seems to suggest, thus bring with them a stronger sense of identification with groups outside higher education than do students for whom higher education was part of becoming an adult (1998: 14). Thesen differentiates two senses of transition in higher education in South Africa: first, in terms of the current political and the social change, and second, in terms of "the learners experience as they enter the new literacy practices of the university" (1997: 489).

Ballard and Clanchy also refer to transition in terms of past and future. They describe how student writing is often decried by academics for being "illiterate". They argue that such academics fail to "recognize the problem for what it is – an unsteady transition between cultures" (1988: 13). To respond by crying "illiteracy" reveals an autonomous view of text – something not linked to the discipline or social context in which it occurs, but a universal set of skills that the students bring with them from school when they enter university (and which would thus constitute their literacy). Such a view makes no allowance for a before and after higher education difference in student literacy.

But this is what this study is all about – how do students experience becoming literate in engineering? What was before? What comes after? For they are not literate in engineering on admission – acquiring the discourse is about becoming literate (Gee 1996: 143). So when Ballard and Clanchy refer to making an unsteady "transition between cultures" they refer also to the students' experiences of their pasts and futures. It

is a transition from one culture to another, but cultures are located in time: and the students experience the transition in terms of past and future. They talk about before and after, what they did do, what they will do.

Students' awareness of past and future affects numerous aspects of their discourse acquisition. One such aspect is learning. Memorization becomes understanding. Another is writing. Copying becomes composing. Another is thinking: about self becomes about responsibility to others.

The transitions between past and future, parallels Gee's transition from primary Discourse to secondary Discourse and the implied change in status from outsider to an insider (in the secondary Discourse). In the past they were outsiders, in the future they are insiders to the discourse of engineering. So their awareness of self (identity) is tied to their awareness of past and future – and the present. Thandi articulates this very clearly – "in future I'm this person, so I might as well start practising now". Her current self is lived in terms of her future self.

This strong future focus is quite appropriate given their current studies – it would be strange if they were studying engineering without looking forward to becoming engineers. What is noteworthy is how a shared future prospect (being an engineer) is experienced differently in the present. Compare Colin and Lindiwe: both talk about what they must do in the present because of their future. Colin experiences his future in his present as <u>preparation</u>, he is constantly aware that he needs to make a good impression now to maximize his future prospects. Lindiwe experiences her future in her present as <u>responsibility</u>, she is aware of others who are affected by the decisions she takes. In the same way their pasts seep into their presents, and what may at a glance seem like a uniform present (the experience of acquiring the discourse of engineering) is lived or experienced very differently. They are individuals and have unique pasts. There are political and cultural contexts within which Lindiwe and Colin's pasts and futures must be understood, so differences resulting from the broad categories of gender and race also need to be acknowledged.

Their present experience in higher education – acquiring the discourse of engineer – is designed around the assumption of a unitary past. But, Andiswa's experience of "not having the basics of the technical things from home" as the men have, and Thandi's amazement at the white students' assignment ("I didn't even know that you can buy these – just from the book bookshop"), show just how different their pasts are.

In arguing the case for training engineers to become lecturers, Wancat and Oreovicz cite the need for engineering lecturers to be able to train "nontraditional students such as women and underrepresented minorities" who "require different educational methods" (1993: 2). This sensitivity to the different experiences of women and other nontraditional students is not apparent in the experience of the black women in my study. Their experience is of a curriculum designed for a traditional student (white and male) with a traditional past. In the curriculum the present is treated as being hermetically sealed from the past, as if no particular past better prepares or gives access to the discourse of engineering. But my data show that the students experience the present (the acquisition of engineer discourse) differently – because of their pasts. The present is not hermetically sealed from the past. There is no point at which the past ends or the future begins – both are experienced also in the present.

The curriculum takes no account of the fact that for one student telling the workers what to do comes easily because of his initial socialization, but for another it requires considerable social skill because of her initial socialization.

There is one discourse they must all master – no matter what there past – and as individuals they find ways to accommodate the difference between past and present. That they do this adequately and powerfully is evident from the way in which the black women are not hampered or handicapped by their pasts in which they acquired their deference to elders and men. Nor do they attempt to hide their pasts: "I know where I came from" (Lindiwe), and "we were never given assignments in our schools" (Thandi),

and “I can switch back, because yeah, I’m still living in that” (Pumeza), and Colin about his frustration at the slow pace in class “ I really know this – I’ve done matric English”.

They are acquiring the discourse of engineering – this discourse is the same for men as it is for women, for blacks as it is for whites, for Muslims as it is for believers of other faiths. What is different is the individual’s experience of acquiring it. This one discourse requires that an engineer directs the operations in the plant, and if necessary tells the workers how to perform their jobs in the most efficient way. It does not make allowance for cultural or social discourses that students bring from their pasts. My data show that it is the individual who makes allowances, who accommodates, who creates relationships.

Chapter Seven

A further discussion - The implications of students' experiences for understanding discourse, writing and learning

The findings were first presented as themes and the general description. In the preceding chapter I went on to discuss the findings, but I cannot yet move on for the previous chapter's discussion raises two questions that are significant for our understanding of the acquisition of engineering discourse. This chapter is thus a short detour before resuming the journey, now nearly at its end. What I say here flows directly from my discussion of the findings, but not from the themes or general description hence its inclusion in a separate chapter.

The two questions are both about the students' experiences of writing, the second following from the first:

1) Do the students include writing in their conception of being an engineer (that is, do they experience writing as an integral part of engineer discourse)?

2) What are the implications of this inclusion or exclusion of writing in their conception of discourse for our understanding of how they acquire the discourse?

I raise these questions because it seems as if there is some ambivalence or ambiguity about their experiences of writing as a manifestation of their discourse acquisition. While their experiences of acquiring the discourse of engineering is explicit as regards thinking, valuing and doing, there is some ambiguity about how to understand their experiences of writing. The students' experience writing in two fundamentally different ways; writing reports (on their industry projects) and writing assignments (set by lecturers as part of their course work). They experience the difference in terms of their identities and their

locations (sites of learning); these in turn affect their perception of audience (reader) and purpose.

7.1 Writing: the experience

To answer the first question I begin with Thandi's experience because she is possibly most explicit about writing, and her description resonates with what the others say. What she says about writing is considered – it's not an occasional throw away line or facile in any way. She is expansive and clear about her experience of writing – and modest (even a bit hesitant about having learnt to write as an engineer although she is generally confident about other things).

Thandi makes numerous references to the difference between writing reports and writing assignments. She perceives an assignment as something "you do it just because you have to get the marks, not for learning something out of it". What matters is that it "make(s) sense to him" (the lecturer). She says it is unlike a report because all she does is "find the information, and then you like check the information and try it to make sense to the way he wants it and to give it to him". Again, a little later on, she says an assignment is unlike the oral presentation of a report, for in an assignment "you just take the information from Internet, just print it, then, take the information that you think the lecturer wants and give it to him". There is no sense of doing anything with the text other than "just" filling it with information. Her awareness of task requirement is certainly not what Flower (1994) describes in her theory of how a student learns to write. She laughs when she says that to her, assignment writing is "like photocopying". Laughing at herself indicates a meta-awareness of what she is doing and how it differs from report writing (or what writing should be). She is quite explicit also in saying that although she knows an assignment must have an introduction, that "I don't know what you have to do in the introduction". This is not the kind of experience Bazerman and Paradis imply when they ascribe to texts the role of transacting activities within a discourse community (1991: 5).

Thandi's perception of report writing which is more sophisticated is described in contrast to assignment writing. (She equates writing tests and making oral presentations with report writing). This contrast between the two types of writing is clear in the manner she describes purpose: reports are for doing something as an engineer, as opposed to assignments in which the purpose is getting enough marks to pass by complying with the lecturer's requirements. Underpinning this distinction in purpose is her awareness of her multiple identities. When she writes a report she is an engineer; when she writes an assignment she is a student (with no pretence of being an engineer, or attempt to imagine being an engineer). This distinction is not the result of textual features – it's not about genre – it is about identity. (I do not wish to suggest that industry reports and academic assignments are the same in terms of genre, but merely that her differentiation is not made in terms of genre. I return to the notion of identity and genre later in reference to Christie (1991) who raised the notion of "curriculum genre").

In describing how she learnt to write a report she begins by saying that because it is derived from her work in industry she experiences it as something she is "actually doing", and not a "question" as is her experience of assignments in class. This means that she can not go to a book or the Internet, that she must come up with something that she did, so "like it's all from yourself… It's actually coming from you". Even when she implements a solution previously developed by somebody else she feels involved "you also did it and find out that that person was correct". Ultimately writing a report in industry is " from something you were doing there and which you were in at the time". From this one gets a strong sense of writing as doing engineering, and of writing as being in it. The way Thandi describes her experience of writing reports calls to mind Emig's representation of "writing as a unique mode of learning" (1977: 122).

Thandi's experience although it is unique, certainly resonates with the experience of the others. Colin too, is quite explicit in differentiating between writing reports and writing assignments. He says that he takes more care with industry reports than he does ordinarily where he is "inclined to just write". He seems not to perceive writing generally as a part of engineering discourse. Andiswa makes a more oblique reference to

the difference between writing reports and writing assignments. On the whole she considers report writing in terms of format but then adds a more complex reference to purpose: "especially in a report you have to understand what is the purpose of this report, how you got all the ideas, how you investigated your ideas". This perception of a report indicates an awareness of doing something with text, of engineering through writing, and of writing as part of engineering. Zayeed has not done any experiential learning which he feels compromises him in terms of writing (not having done this means he has not yet had the opportunity to be an engineer). What report writing he does is as a student for classroom use, it is reproductive ("it's from the textbook") and much as the others experience their assignment writing. He makes no attempt to imagine that he is an engineer, or to take on the role of an engineer – his experience of writing is only as a student. His perception of report writing locates writing outside the discourse of engineering.

Lindiwe experiences assignment writing as the rigid execution of lecturers' instructions. Her experience of an assignment is of a task set by a lecturer in which she merely follows instructions. She does not experience it as part of engineering. Her articulation - "They always give us the assignments, 'do this' and 'do that'. So I try all the time to be specific" – evokes Bizzel's "mindless chore imposed by some martinet" (1982b: 202). Pumeza also experiences assignment writing as a task imposed, and requiring strict compliance. She describes how she tried at first to follow the lecturer's instruction ("I've put in all the information he gives in the assignment"), but still failed. She then asked him in advance "exactly what he wants". She does not experience writing an assignment as doing something with a text herself, or as requiring her to reflect on the task requirement except in terms of information to be included.

Lindiwe's experience of assignment writing forms a stark contrast with the rich and complex way in which she experiences report writing. She shows an astute judgment of audience and purpose in the writing of two different versions of a report – the one for her industry employer and the other for her lecturers. She knows what each audience values and what will be considered as evidence by each, and adjusts her report accordingly. In

this case she certainly experiences writing as an integral part of engineering discourse. One cannot fail to understand her "mindless chore" perception of assignment writing as something very different to her complex and expert perception of report writing. The one clearly stands outside the discourse of engineering, the other squarely within it. Such difference in perceptions calls to mind Herrington's argument that as lecturers we need to rethink "the monolithic nature of writing in an academic setting" (1985: 354). Herrington found that engineering students' perceptions of context affects their academic writing: writing produced in simulation settings differs from classroom writing. What this study has shown is that students experience industry writing differently from classroom writing - even though both are formally assessed.

At the root of Lindiwe's differentiation lies her experience of herself as having multiple identities. When she writes an assignment she is a student, and when she writes a report she is an engineer. Ivanic points out that a writer may construct a quite different discoursal self from one text to another depending partly on autobiographical changes and partly on the different demands of different occasions for writing (1998: 29). The writer's identity is evident only through the discoursal self (which is unique to a particular text). But in higher education we assess the student's acquisition of engineering discourse on the basis of one (or more) particular text(s). A particular text reveals a particular (discoursally constructed) self or identity. The students do not experience the self as a single homogenized assimilation taking on different roles, but as distinct multiple identities each of which perceives and experiences writing tasks quite differently.

7.2 Academic writing: a side order

Based on their differentiation between report writing and assignment writing it is possible to characterize their experience of <u>academic</u> writing in the following manner:

7.2.1 As separate from content

Colin bases his reference to writing as separate from content on his perception that lecturers are more interested in content. He says "you need to put down some facts … they just really want to know for that question, if you know what you're talking about". Pumeza's response to my question about how she knows it (her writing) is correct is an oblique reference to the same perception: her response "what is correct? The project or the writing?" indicates that in her experience the one can be considered correct separately from the other. Zayeed also makes a separation of writing and content when he says of the lecturers' perception of writing, "I get the feeling they are more interested in what you are saying".

This shallow perception of writing as something 'on the side' and not inextricably part of the meaning (what they refer to as content), is supported by their association of writing with mechanics. Colin says that as an engineer he doesn't "judge people by what they write, so I don't know if that would [matter] much". He refers to appropriate writing in terms of grammar and spelling. What makes writing good is "as few grammatical errors as possible", and correct spelling ("your spelling can tell a lot about you"). This is writing as a junior school teacher may conceive of it – but certainly not as an integral part of engineer discourse. Zayeed also equates good writing with correct spelling and grammar rather than good engineering. He believes "Lecturers want to see that you explain yourself correctly or er, grammatically". His understanding of 'correctly' seems limited to mechanical aspects and does not include rhetorical aspects.

7.2.2 As having sections

Rather than referring to writing as something that they do or an interaction with others, they refer to writing as having sections. It is a repository for information, built to the

specifications of the lecturer or the logbook, or modeled on examples written by other students or published in books.

Zayeed says "we should follow this type of formal system… having an introduction, having a summary, having a conclusion, giving examples as well as referencing it …". Thandi similarly focuses on having sections, "They have told us that you have to write an introduction and conclusion, …You know the assignment, that is the cover page, the index, the text, introduction to text, but you don't know what is actually – what is needed". Andiswa says of reports which although usually written for industry are first taught in the classroom, "we were taught about report writing so we knew we had to write all these things – terms of reference, table of contents". She enforces this by saying " I go to the library and take out a book that is going to show me the format of the report, how to write it…". What Colin says about the type of feedback he prefers also points to a perception that writing is about having all the right sections: "they show you where for introduction you got so much, for this section you got so much, conclusion you got so much and references etc". He seems to regard his writing not as a whole integrated social act or cognitive process, but as a compilation of discrete sections.

Writing is regarded as a document produced by following a set format. Where they refer to sections it is not in terms of the function of the section, or what rhetorical moves they need to accomplish in that section, but merely to the presence of that section in their texts. Their notion of 'genre' (if their 'sections' can at all be called this) is what Swales refers to as a "paint by number" or mechanistic approach (1990: 33). They show no awareness of genre in the sense meant by Kress (1989), Eggins (1994) or Martin (1985) who uses genre to refer to how things get done when language is used to accomplish them. Because they separate writing (and language) from content, there can be no sense in which they use language to do something (in engineering).

7.2.3 As gathering information

Students place great emphasis on the gathering of information as part of writing – this fits with their perception of filling the repository. Andiswa's experience of a collaborative

project does not fit the process theorists' notion of collaborative writing, but consists of pooling ideas and typing them up. Although she does refer to talking about what they were going to write, it amounted to a mere pooling of ideas and then typing them up. Zayeed says of his participation in a collaborative assignment that the first step was "collecting all the knowledge", and of the body of the assignment he says they considered "what does it consist of". Pumeza describes how she tries to meet the task requirements: "I think okay, I understand, but at the end, when I've put in all the information …". She too, sees writing in terms of putting in all the information.

I return now to the first question I raise in this chapter: do the students include writing in their conception of being an engineer (that is, do they regard writing as an integral part of engineer discourse)? This question cannot be answered unconditionally for there are two possible answers. If writing refers to reports, the answer is yes. If writing refers to assignments, the answer is no.

This distinction between how they conceptualize reports and assignments stems from their experience of their multiple identities. They are engineers when they write reports, but they are students when they write assignments. This is not a watertight distinction, nor is the distinction simplistic, but it does serve as a way of understanding the significant difference in how students experience the writing of reports and the writing of assignments.

It is as if classroom writing is not an essential constituent of engineering discourse (which includes for example, knowing what topics are appropriate, or what constitutes a valid claim, solving real problems in industry using conventional techniques, making judgments, valuing productivity improvement). In the context of assessment in higher education, writing is regarded as the textual manifestation of discourse acquisition. But to students writing is a side order. This notion is implied by Colin who says "we did know how to write a letter and all the basic things – but this is something you learn in communication". The "but" seems to indicate that for him it stands outside engineering. He goes on to say that although he needs to know how to write, if he ever got stuck, he

could ask “one of the secretaries if I wasn’t sure”. He does not turn to an engineer for guidance with his writing. When asked whether writing matters, he says “Normally it could - if it’s from engineer to engineer it doesn’t really matter”. Academic writing is not experienced as engineering. This is evident also in what Andiswa says of her participation in a collaborative writing task: “I just think of myself as typing the others’ work”. Academic writing is not experienced as engineering.

Zayeed too, does not experience academic writing as learning in the sense Emig (1977) had in mind when she describes it as a “unique mode of learning”, for he says “I think writing plays a big part [in learning] because I mean, you write out all the facts…”. Pumeza, in describing the insight she gained during her experiential learning, says at first she could not understand the need for the writing course “because I’m an engineer, so I don’t have to do administrating work, I don’t have to write”. Clearly, prior to working in industry she saw no place for writing in engineering. She later comes to regard writing as part of engineering because of her experience in industry.

The students thus have two different experiences of writing. To become an engineer they do things engineers do (including writing in a meaningful manner). Being a student entails a different kind of writing (as separate from content, as having sections, as gathering information). They experience their multiple identities as separate, and will thus not be inclined as students to do the kind of writing engineers do, or as engineers to do the kind of writing students do.

The writing they do as students differs from the writing they do as engineers: in their writing their multiple identities are made manifest. It is not a case of being a student and taking on, or trying on the role of an academic or professional engineer. Writing as a student is about complying with requirements without regarding it as something that is part of being an engineer. However, writing as an engineer is about being able to show how they conceptualized and identified an actual problem in industry, how they used engineering theory and techniques to develop and implement a solution that improved productivity (it thus also embodies a central value of industrial engineering). In industry

students (later graduates) will have to resolve ill-defined problems, that is be "asked to deal with situations that do not have answers in the back of the book. That is most domains of expertise involve some component of judgment as to what counts as a satisfactory outcome" (Geisler 1994: 61).

In class they write as students do: they copy information. Such writing is not experienced as part of being an engineer, and in many cases also not as part of their learning. It is short term – to get marks to pass - and far removed from Emig's "unique mode of learning" (1977: 122).

7.3 Writing: the implications

But having established that there are two answers to the first question, I move on to consider the second: what are the implications of their experience of the two types of writing for our understanding of how they acquire the discourse of engineering? This second question can be further refined in light of the answer to the first question: what are the implications of their exclusion of assignment writing from their experience of discourse acquisition. It is to this that I turn before considering the implications of their experience of report writing.

It is difficult to understand their experience of assignment writing as meaningful in any way other than short term and strategic, that is for marks (passing) rather than for learning. Even Christie's notion of "curriculum genres" which "constitute instances of socially significant activities in which persons engage in western cultures in order that people be educated" (1991: 237), does not help in understanding their experience of assignment writing. Johns makes a similar distinction between "classroom genres" (in this case, an assignment) and "authentic genres" (in this case, an industry report) (Johns 1995: 282). She argues that unless lecturers are careful about establishing connections between curriculum genres and authentic genres "students may be locked into an undergraduate pattern, an inability to move beyond the requirements of the curriculum genres to an initiation into an academic or professional discourse community"

(1995: 283). Students regard reports as part of the discourse of engineering, but assignment writing is left stranded and does not serve to initiate students into the discourse of engineering. Reports are real – they enable the student to explain an engineering problem and propose a solution. They experience report writing as engineering and learning. Assignments on the other hand are clearly inauthentic: for as Johns points out, they are not required of mature professionals in discourse communities (1995: 289).

If as Christie (1991) argues, curriculum genres are significant activities in order to get people educated, then it becomes almost impossible to understand the students' experience of assignment writing in terms of a curriculum genre. They describe their experience of assignment writing neither as significant nor as contributing to their education as engineers.

But if not as curriculum genres, what are the implications of their experience of assignment writing for our understanding of their discourse acquisition? It may be that as academics we have a different perception of texts and their function from the students. Bazerman and Paradis argue that texts function to "consolidate professional interests, enroll novices into the professions, and direct human activity with far-ranging social consequences" (1991: 10). The students' experience of assignment writing is certainly not as initiation into the profession. Bizzel's reference to "a mindless chore imposed by a martinet" (1982b: 202) seems closer to their experience.

We need only consider what they experience doing as they write to understand that their assignment writing does not initiate or enroll them in the discourse community. At first they have a blind approach to writing – writing as Thandi says, without having a clue of what they are doing. They look for library books containing the words 'tensile testing' because they appear also in the wording of the assignment. But they outgrew this approach when in the second year their lecturer saw that they had "no clue" and made explicit to them what they should be doing (in terms of what they should be putting into the assignment). From this comes the compliance approach to writing – writing as

complying with, or following the instructions of the lecturer. Zayeed says "…you have to ask specifically what does he want and what does he mean". Pumeza links such compliance to attaining better marks: " 'Okay, this is what I've drafted so far. So how do you want it to look'? Yes, I asked him and they [marks] were getting better and better". There is evidence now of 'having a clue', about compliance, but that is all it is, a clue. Their sense of task requirement is limited to an awareness that the lecturer has made some stipulations, that they cannot just match words in book titles to words in assignment titles. This is task awareness as blind compliance with what the lecturer has said. It's about being able to get the lecturer to reveal more than he did initially in class. While this approach shows more task awareness than the word matching approach, it is not about making sense for themselves or engaging at a rhetorical level or solving problems. It is about putting in information that the lecturer wants (and the challenge lies it seems, in getting him to reveal what he wants).

7.4 Multiple identities and sites of learning

Having established that in their experience report writing is an essential part of their discourse acquisition, I turn now to considering the implications of this experience. Although their report writing is experienced as part of their discourse acquisition, it too may differ from how writing and discourse are described in theory. Where discourse and writing theories place writing as the hub around which the initiation into the discourse community occurs (Bizzel 1982, Bereiter and Scardemalia 1985, Becher 1987. Bartholomae 1988, Taylor *et al* 1988, Beach and Hynd 1990, Berkenkotter, Huckin and Ackerman 1991, Bazerman and Paradis 1991, Flower 1994, Geisler 1994, Gee 1996, Ivanic 1998), for these students writing is one among a number of means whereby they are initiated into the discourse, and one among a number of ways in which they establish and signal their emerging identities as engineers.

Both the social interaction and process theories assume or imply a high level of awareness on the part of the student: they imply an awareness on the part of the student of doing something with the text – using text to signal mastery of the discourse. Ivanic's

reminder that " 'Literacy' is both *less*, and *more* than 'language' "(1998: 57) is a useful parallel instance with which to understand the students' experience of using text to signal mastery of the discourse For although they use reports to signal their mastery, they also signal their mastery of the discourse quite clearly in non-textual ways – for example, by solving problems using conventional techniques or valuing productivity improvement. Their primary awareness is of using the report to accomplish a more mundane task – identify the problem and propose a solution. Their experience of using reports to signal their mastery of the discourse seems secondary, it is done almost in a matter-after-the-fact way. Their primary concern is with the task at hand – writing is a necessary (and important) part of getting the task accomplished, but it is not an end in itself (as it may well be to an academic).

Their experience of the different sites is intimately linked to their experience of multiple identities, and these two linked experiences are what cause the great divide for students between authentic writing (reports) and classroom writing (assignments). Earlier in this chapter I discussed the significance of their experience of their multiple identities for their writing, and I turn now to their experience of the different sites of learning.

Theories of writing are usually based on research in dedicated composition courses, or courses in liberal arts programmes that are transacted in classrooms. Relatively little writing research occurs in engineering programmes that are transacted both in the classroom and on the factory floor. Herrington (1985) investigated student writing in an engineering programme and looked specifically at the difference context makes to student writing. She found that there is a difference between classroom and simulated 'real' writing, and argues that if students find academic writing contrived it is because of the context (classroom) rather than the nature of the assignment itself (1985: 335).

Being able to be an engineer seems to obviate the need to imagine being one as writing theories premise. Students don't role play or imagine being an engineer. Either they are engineers in the factory and write like engineers, or they are students in the classroom and feel they "have no clue" about academic writing or perceive writing to be about

satisfying the lecturer. While their industry writing develops to a relatively sophisticated level where they write to perform their engineering, their academic writing does not develop beyond complying with lecturer instructions.

Zayeed, the only student who has not yet been to industry, is a case in point. He believes not having industry experience has repercussions for his writing: it has not developed as much as that of students who have industry experience. He says "so basically I only had theory knowledge and no practical knowledge. I think practical knowledge will help you explain things well (in writing)". He links writing well to practical knowledge which he does not yet have. He believes that theoretic knowledge is unable to facilitate good writing. Flower's distinction between saying something in text and doing something with text (1994: 144) is useful for understanding the implications of what Zayeed says. Using text to say something (in assignment) is less beneficial for discourse acquisition than using text to do something (in report writing). Zayeed seems to say that because he has never been an engineer he cannot write like an engineer – that he does not try to imagine being an engineer. He makes no reference to trying to imagine being an engineer. What he does when he needs to write from an engineer's perspective is draw on the experience of a friend to gain that "advantage".

It seems as if experiencing engineering, doing it ("from something you were doing there and which you were in at the time": Thandi) makes writing a meaningful task, and so qualifies it for inclusion in the students' conception of engineering discourse.

Their experience of having multiple identities and learning on two different sites also affects their writing in another way not referred to in other research: they do not, as is the assumption in theory, experience the need for a special right to speak to be conferred on them (Bartholomae1988: 277). Their performance in industry entitles them to speak (write) as an engineer. As engineers they become "legitimate speaker(s), authorized to speak, and to speak with authority" (Bourdieu in Angelil-Carter 1997: 273).

Who and where they are when they write significantly affects their writing. But it also affects the nature of their learning. It is not as students that they learn most, but as engineers. Then the learning is real. Knowledge is appropriated, internalised and understood. Their learning meets the needs of an engineer. Halliday and Martin writing as linguists, refer to writing as an enabling technology for doing science (1993: xii). The way the students experience report writing can be considered an "enabling technology" for doing engineering, but assignment writing is merely an "enabling technology" for getting marks. Herrington argues that while demonstrating knowledge is a valid purpose in classroom writing, given that purpose that's all the students will do (1985: 355). As students their learning is shallow, about memorizing to pass tests. Their learning only meets the needs of a student. Thandi articulates this so clearly:

> Of course we did it in class, and we were taught how to do it, but when you come to the industry, you find, you find that you don't know how it was done. If you just memorized it, I think, I don't know, I don't think you will know it. They will have to teach you again in industry what to do.

What I have said in this chapter may seem less than ideal when considered in terms of the experience of discourse acquisition described in theory. That is because I have looked only at the students' experiences of discourse acquisition. Their experiences and perceptions are possibly quite different from what lecturers think they experience and perceive. As lecturers we may need to revise

Chapter Eight

Concluding comments, review and reflection

In this chapter I have created separate sections for reflection on the substance of the study and the methodology of this study, but such separation is not meaningful in any context other than a reflection such as this: the substance of my understanding is inextricably related to the phenomenological method of this study.

8.1 Concluding comments and recommendations

My purpose in this study was to understand the phenomenon of discourse acquisition in undergraduate engineering students – that is, to understand how students experience becoming engineers. My choice of phenomenology was a considered one. Although it occasionally needed some defense (particularly to colleagues who seem to expect a greater 'sample' of students), I come to the end of the study satisfied that it was an appropriate choice. That is not to say that the choice of a phenomenological method does not limit the study in some ways: as with any method, it has limitations and I discuss them in the following section. It was appropriate because it has given me a better understanding of what it means for my students to acquire the discourse of engineering.

In a field where discourse analysis of student texts, think aloud protocols, observation of collaborative writing, and retrospective accounts and explanations of writing are commonly used, a phenomenological investigation has given me a different perspective on student writing and discourse acquisition. Because of its focus on the students' lived experiences, it has allowed the significance of who they are (identity) and where they are when they write (context) to emerge in a manner that may not have occurred had I chosen another methodology. Although identity and context are aspects of discourse acquisition regularly referred to in existing research and theory, my understanding of identity and context is changed because of what students revealed of their experiences in this study.

The students are aware of themselves as having multiple identities – an experience different to role playing or imaging being some other identity. Furthermore, they experience their multiple identities without the alienation or inner struggle that often accompanies references to an awareness of multiple identities in theory or other research (Gee 1996, Angelil-Carter 1997, Peirce 1997, Thesen 1997, Ivanic 1998). The students' experience of their multiple identities is closely linked to their experience of the site at which their learning occurs, and these two experiences lead to a very clear distinction in their experience and perception of writing.

What they do, how they write, and what they learn differs for report writing and assignment writing. Report writing is a meaningful activity, a means whereby they transact or practice their engineering and signal their identity as engineers. It is an integral part of the discourse of engineering. Assignment writing is meaningless in terms of learning or engineering; its only value lies in obtaining marks. It is a means whereby they signal their compliance with the lecturer's instructions in exchange for marks. It is not perceived as an integral part of the discourse of engineering.

For a writing teacher these findings are rather sobering. How are they to be reconciled with established theory on which we as academics and lecturers rely in our research and teaching? What are the implications for course design, teaching and assessment?

There is no theory that describes writing as my students experience it; even Bereiter and Scardemalia's (1985a) theory of "knowledge-telling" differs from the experiences of these students. Bizzel's allusion to "a mindless chore imposed by some martinet" (1982b: 202) keeps echoing in my mind, but to end my study with the conclusion that students experience assignment writing as mindless is most unsatisfying, and too cynical. Lecturers are not martinets, and writing is not a mindless chore.

In trying to find a point of contact between my findings and my theoretical understanding I am reminded of the research of Herrington (1985) and Braine (1995) both in the field of engineering. Herrington questions the function that writing serves in an engineering

course: "More specifically, how do written assignments introduce students to the intellectual activities, social roles and purposes for writing that are important within a given discipline" (1985: 331)? Braine having analyzed and classified writing assignments in science and engineering programmes, quite simply recommends "de-emphasizing the library research paper" (1995: 113).

Given that the students do not experience report writing in the same mindless way they do assignment writing, this may be a good question and answer to bear in mind in concluding this study. The students write their industry reports with an awareness of the nature Gee (1996), Flower (1994) and Bizzel (1978) refer to. Gee, in differentiating between acquisition and learning points out that both involve awareness on the part of the learner: in acquisition "…acquirers know that they need to acquire the thing they are exposed to in order to function…" and in learning the learners undergo a process "…that trigger(s) conscious reflection" (1996: 138). Bizzel also indicates a high level of awareness on the student's part when she says that in making the ethos of the academic discourse more accessible to students, lecturers require students "to think about the kind of person the intellectual work of college seems to be asking them to be" (1978: 353). In attempting to master academic discourse the student is "…attempting to pass for a member of a particular cultural group …" (1978: 354). There can be no doubt that writing and discourse acquisition - far from being mindless - require a particular awareness on the student's part. This awareness is evident in their experience of report writing. It is thus not that the students are incapable of the type of awareness and reflection Gee, Flower and Bizzel refer to, but merely that it does not occur in their assignment writing.

At the root of this difference between report writing and assignment writing lies the students experience of their multiple identities: when they experience their identity as being an engineer, they write in a way that approximates that of engineers. When they experience their identity as being a student, their writing no longer approximates that of professionals and is perceived to lie outside the sphere of engineer discourse.

The students' awareness of their multiple identities is a central aspect of their experience of acquiring the discourse of engineering. But my findings differ from theory in terms of their experience of multiple identities. Where in terms of theory, the experience of multiple identities often leads to a sense of alienation or inner struggle, the students in this study do not experience such alienation or inner struggle as a consequence of their awareness of multiple identities. The accounts of alienation or inner struggle found in theory have never given me reason to doubt. Thesen's (1997) documentation of Robert's deep sense of alienation is an eloquently powerful account, particularly because it is based on research at a contemporary South African university. I have described the students' awareness of their multiple identities as lacking a sense of alienation cautiously, aware of Bizzel's criticism of "finessing the essential conflict between academic discourse and the cultural capital" (1982b: 195). However, in the experience of these students, conflict is not essential.

My choice of a phenomenological method may then be most fruitful on this issue. As phenomenologist I approach my data suppositionlessly, not looking for what a particular theory or philosophy inclines me to, but in conceptual silence, to listen only to what the students tell me of their experiences. And yet, as someone working in higher education I cannot unknown what I know about discourse acquisition or writing theories. Nor can I unknow what I know about the transformation of higher education in South Africa. Through my teaching, the contributions I make to informal discussions and formal debate on campus, the votes I cast and the decisions I make, I have in many ways been involved in the transformation of higher education. And this experience along with my theoretical knowledge informs my understanding of the students' experience of discourse acquisition. So, despite my commitment and constant awareness of the *epoche*, I make no pretence to know objectively.

The phenomenological method requires that as researcher I suspend or bracket my theoretical suppositions or preferences, and so precludes me from justifying on theoretical or philosophical grounds a particular interpretation of the students' experiences. But it does allow me – in fact demands of me - to explore in depth the

world in which the students experience the phenomenon, their *lebenswelt*, so that I may know it as they know it. And despite their awareness of the differences between men and women; black and white; workers and engineers; Xhosa and English, it seems that they do not know it as a place where becoming members of the discourse community causes them inner conflict or alienation.

In attempting to encapsulate the essence of the students' experience as described in this study, I conclude that these students have a strong sense of individual agency. They have a stronger sense of determining their position in the engineering community than they have of their position being determined for them. It seems that as individuals they position themselves as engineers in ways that are acceptable not only to the engineering community, but also to themselves as black, or woman, or Muslim. One could argue that their positioning may be a bit off-centre, but it is clearly still accepted by the engineering community and regarded as sufficiently close to centre for them to be considered as engineers also by people outside the engineering community.

Each student enrolls in the programme with the intention of becoming an engineer. They change over the three years in fundamental ways, and take on a new identity as an engineer, but without sacrificing or compromising who they are. They do not experience becoming an engineer in terms of struggle or alienation. They are still black, or Muslim, or women. They are not homogenized by acquiring the discourse of engineering, and they practice their engineering as a black, or a Muslim or a woman. And because they do not attempt to disguise or deny their other identities they do not experience alienation or inner struggle.

Ivanic argues that "the array of discourse conventions within the community diversifies, and the patterns of privilege among them shifts" as the academic community becomes more heterogeneous in terms of values and beliefs (1998: 314). So too, as engineering graduates become more heterogeneous in their values and beliefs the array of conventions and the patterns of privilege may shift in the engineering community. I believe that the students' lack of alienation and inner struggle can be understood in the context of a shift

in the academic and industrial communities in which they acquire their engineering discourse. For the community is but a collection of individuals bound by common goals and values, and the individual students in this study are more aware of themselves in relation to the other individuals with whom they establish relationships than they are of their relationship with a monolithic abstract community of engineers.

But what are the implications of how the students learn (acquire the discourse) for course design, teaching and assessment? It is clear that much of the students' acquisition of discourse occurs in industry. The course is well designed in this regard as it includes two semesters of experiential learning. This learning is "real", and in the students' experience, superior to classroom learning. But as classroom learning is also necessary, it would be advisable to look at ways of creating different expectations (among lecturers and students) of what is to occur in the classroom. There is much strategic posturing in class – students behaving in ways to (mis) lead lecturers into thinking that they (students) know what is going on. Lecturers also seem to neglect their responsibility to model things for students and tend just to tell them about things that leave students no choice but to memorize (without understanding) what the lecturers or the notes say. There needs to be greater honesty and sensitivity in the relationship between student and lecturer.

But most important, lecturers must teach and assess in a way that makes it clear to students that discourse and writing matter (as much as content). While content remains the focus of classroom teaching and assessment, then it is to be expected that content will remain the focus of classroom learning. Lecturers need to create and initiate more opportunities of the kind of learning and discourse acquisition that Pumeza initiated and experienced when she pursued the meaning of *centroids*.

I believe that the implications for course design, teaching and assessment are clear: lecturers must change their expectations of assignment writing. Students are keen to comply – to do what the lecturer expects – and this experience should be exploited by lecturers. If lecturers expect (or at least accept) an untransformed copy of the information in the library, then that is what the students will produce in their writing. By rejecting

such writing, lecturers may sway students to produce in class the meaningful writing they do for industry. It may then be possible that students experience writing generally (not only report writing) as part of their acquisition of the discourse of engineering.

What this study shows of students' experience of discourse acquisition indicates that lecturers need to change their practices. Where students have shown that assignment writing is done only to satisfy the lecturer, there seems no sense in continuing this practice. It is necessary that lecturers find ways to give students meaningful opportunities to write before they go to industry. What makes their writing meaningful in industry is that it is real or authentic. It thus becomes essential that classroom writing also be made authentic and meaningful (that is, for purposes other than obtaining marks). An outcomes based approach, though much misunderstood and maligned both in South Africa and the United States (Spady 1994: 151), may present a way of attaining the necessary authenticity. An outcomes based approach shifts the focus away from the grade obtained, which has only symbolic meaning, to what the student can do as a result of the learning, which has substantive meaning.

The distinction between an objective based approach and an outcomes based approach needs to be exploited fully. In an objectives based approach it is possible that students submit the meaningless writing they do, knowing full well that they have not learnt anything from it but that it complies with the lecturers' objectives - that is, the text has all the stipulated sections. As Thandi so frankly says "you can have marks, but you actually find out that you don't know". An outcomes approach allows for a more open (and honest) exploration of student learning (as opposed to system of grading).

Associated to the shift from objectives to outcomes is the shift away from content to be covered to competencies, or clusters of skills which students are expected to master and use in various settings. Competency rather than grade achieved should be the focus of our assessment if as Brown suggests "the development of intellectual competence can be regarded as one of the main purposes of higher education" (1997: 257). Competence rather than content is what discourse acquisition is about, and resonates with Gee's

reference to "mastery of secondary Discourse" (1996: 143). Learning a discourse is not about content only but about competency, and it is necessary that this is apparent in assessment.

There needs to be a balance between content and competence also in the way that writing is taught. In the separate writing course content is also a problem, but for a different reason. Pennycook, writing about second language teaching refers to the "trivialization of content" (1989: 596), a claim that could also be made against a separate writing course in an engineering programme. As writing teacher, I am not part of what the students regard as "our faculty" – I am not an engineer, and so my content is trivial to the students because it is not real engineering. One cannot write without content. The writing the students do is always about something, and if that something is perceived as trivial to the students, writing itself will always be perceived as something trivial or peripheral. If the writing can be about engineering, and for engineers, then students will possibly regard writing as an integral part of their engineering discourse. To achieve this requires changing writing from a separate course on the periphery, to an integrated part of other courses. This requires team teaching – where as a language teacher I work alongside an engineering lecturer in an engineering class – where writing is not separated from content.

8.2 Reflections on methodology

When I initially designed this study, I planned it in two parts: a phenomenological study of students' experience of discourse acquisition and an analysis (of some sort) of students' texts. At first it seemed to me so obvious – even necessary – that students' texts be included. It took many months of reading before I realized that I was trying to do the impossible: design a phenomenological study with some empirical data as back up. Once I realized this I could abandon the idea of trying to include students' texts. But only when I was well into analyzing my data was I to fully appreciate the value of a phenomenological study.

In research on writing and discourse acquisition texts seem to be a standard feature, whether as a completed text, or as an emerging text in the process of being written. And so, at first it seemed obvious that texts must form part of the data. And yet now, it seems to me that my contemplation of using texts to understand a student's experience of discourse acquisition is much like trying to figure out the lifestyle of a supermarket shopper by what he or she loads into the trolley. It may be possible to figure out whether the person has a small child or a heart condition, but there is more to the person's lifestyle than items contained in the trolley. So while it may be suitable for passing the time in the queue, it's not quite good enough if I really want to understand that person's lifestyle.

As I was seeking to understand students' experience of acquiring the discourse of engineering, analyzing their texts would not be appropriate or adequate. I was not looking at engineering as a way of writing, but as a way of being in the world. By limiting myself to an analysis of student texts, I would have confined myself to engineering as a way of writing – a linguistic investigation. While texts are undoubtedly a revealing source about someone's writing, writing is not all there is to discourse acquisition (albeit that in higher education writing is a central manifestation of discourse acquisition). There's more to discourse acquisition than a text can reveal. The first-hand description the phenomenological method offers is a far richer source for a study seeking to understand what it means to acquire the discourse of engineering. It makes allowance for experiences which cannot be reflected in, or inferred from texts.

Not only does the phenomenological method give me access to data that texts may not yield, the data obtained from a naïve description need be no less substantive, authoritative or revealing about the student's experience than data obtained from an analysis of a student's text. Petersen, even while warning against trying to claim for phenomenological research the certainty of positivist research, grants that: "Certainly, one can count as evidence what is seen to be experienced, and this does constitute a kind of data" (1994: 184).

To illustrate, I refer to a student text (Angela's) that Ivanic uses as data in discussing the discoursal construction of identity in academic writing. I have deliberately chosen a text that deals with an experience also raised by students in this study, that of being a woman.

> *Within higher education, we have to been forced to deny whole dimensions of ourselves, from which our personal knowledge is partially, but primarily rooted in our real and valuable experience of social life.*
>
> (1998: 314)

Ivanic goes on to analyze the text pointing out that words like *invalidated* and *forced* belong to feminist discourse as much as they do academic discourse; that the student foregrounds central feminist issues in her reference to *our personal knowledge*, *deny whole dimensions of ourselves and our real and valuable experiences of social life*; and that her use of *we, our* and *ourselves* is the manner in which she associates with "an alternative ideology of knowledge making" and is "committed to her socio-political identity as a woman" (Ivanic 1998: 314). Such an analysis is detailed, useful and valid if - as does Ivanic - one wants to look at the discoursal construction of identity in academic writing. Bazerman and Paradis would include this in their reference to the "far ranging social consequences" texts have in terms of human activity (1991: 10). But because there is more to discourse than texts, and there is more to acquiring the discourse of a field than learning to write, the phenomenological method rather than the more conventional analysis of texts is appropriate in this study.

Ivanic's analysis of Angela's text yields that in her experience of acquiring the discourse of her field she feels she is obliged to deny an important part of herself – her knowledge and experience as a woman. But such an understanding could be obtained as well, or even better through a naïve description. The women in this study raised their experience of being a woman in engineering, and because of the interactive nature of the interview, I was able to probe their experience. The data I work with is in no way inferior to data obtained from texts, but is immanently suitable for the kind of understanding I seek. To move from a student text to a student's experience of writing the text, requires that the

researcher 'reverse engineers', or works backwards and unravels or dismantles. The phenomenological method allows the researcher to move forward with the participant and together in the interview to explore the meaning of the experience for the participant.

Analysis of texts possibly involves the researcher in "imposing (her) own homogenizing categories on texts" (Thesen 1997: 505). The implication of such category imposition is that the researcher rather than the data leads the way. This may result in data being overlooked or forced to fit. I believe the phenomenological method offers more direct and impartial access to a student's experience through his or her *lebenswelt*. I have thus not compromised the design by not including student texts in this study. The most appropriate way to understand students' experience of discourse acquisition is to ask them about their experiences - and to remain open to unexpected responses.

Having declared this I nonetheless feel the need to refer to two enduring issues that seem to shadow qualitative research of this nature: validity and generalisability.

Denzin and Lincoln writing about qualitative research in general say: "Objective reality can never be captured. Triangulation is not a tool or strategy of validation, but an alternative to validation" (1998: 4). Validity is traditionally linked to triangulation, and necessary to establish that the findings are real and true (as opposed to unsubstantiated, or manipulated). Any an attempt to establish whether what the participant experiences is real or true by seeking confirmation from other sources is taboo in phenomenology. Petersen reminds us: "While Husserl did not claim the experienced is more real than the physical, he argued that the real is constituted via experience" (1994: 186). If it was experienced, it is real.

Giorgi (1994) argues that there are in fact, clear parallels between the phenomenological principle of imaginative variation in the phenomenological method, and triangulation in other types of qualitative research. Where the idea in triangulation is to use varied data, theories or researches to reach an unvaried result, in phenomenology the invariant, or essence, is obtained through imaginative variation. Imaginative variation is an attitude of

openness not only to actualized possibilities, but also to unrealized possibilities in the search for essences. Giorgi argues that triangulation is more like "an empirical variation in that it is based on facts rather than possibilities" but adds that from a phenomenological perspective "facts are actualized possibilities" (1994: 215).

In triangulation the intention is to establish validity, that is, whether particular data is supported by other data or sources. Ultimately triangulation and validity serve to establish whether the findings can be considered true and real. However, the principle of imaginative variation requires that the researcher forswear any attempt to establish empirically whether the data (participants' descriptions of experience) are in fact true or real. If a participant describes a particular experience then the phenomenological researcher must accept that experience as real and true for the participant without recourse to other sources to validate it. In a phenomenological study there is no sense in seeking to establish whether an experience is 'actually' real or true. The researcher is concerned only with what is real or true for that particular participant.

If empirical variation of the kind performed in triangulation is inappropriate, even taboo, wherein lies the validity of a phenomenological study? Does this leave me as researcher tenuously appealing to other researchers and readers: "trust me". I believe readers are entitled to more, to a sense of confirmability (Lincoln and Guba 1985). Miles and Huberman, although writing about triangulation in empirical research, talk about triangulation as "convergence among researchers", then go on say: "Beyond this, triangulation is less a tactic than a mode of inquiry" (1994: 438).

In phenomenology the validity of a study lies in the "mode of inquiry", the rigor with which the study is executed, rather than in an extraneous source. Because the validity lies in the rigor with which the phenomenological method is followed, as researcher I must make the methodological considerations transparent throughout the study. The validity of this study depends on my being able to "take the reader along so that he/she can appreciate, and yet critically grasp, what the author has arrived at" (Petersen 1994: 180).

Not establishing whether the students have actually acquired the discourse as they say they have through triangulation (for example, analyzing student texts) may be considered by some as a limitation of this study. In keeping with the phenomenological method, this study offers no judgment on the 'real' or 'objective' extent of their discourse acquisition, an issue which may be of concern to an accreditation body such as the Engineering Council of South Africa, a quality assurance authority like the South African Qualifications Authority, prospective employers and lecturers. A phenomenological investigation aims to understand, not to judge. A study such as this is unable to say anything about how well the students have acquired the discourse of engineering, only how they have experienced acquiring it. In the phenomenological method the researcher does not triangulate in the ordinary sense of the term, but as Giorgi (1994) points out, through imaginative variation. The absence of triangulation (for example, in the form of analysis of texts or observation in the factory to validate the theme that emerges from the interview data that the women experience engineering as a man's world) is neither an oversight, nor a failing in this study, but a characteristic of the phenomenological method.

Another characteristic of a phenomenological study that may be considered a limitation is the focus on the unique or individual which makes generalization impossible. A phenomenological study is concerned not with the general, the shared or the typical, but with the unique and variable instance. This study is thus not able to declare categorically that this is what it means for (all) students (anywhere and always) to experience the acquisition of the discourse of engineering. From responses to inquiries about my study, it would seem that generalisability is widely expected and even regarded as an indicator of the worth or value of research. My stating at the end of a long study such as this that it yields no generalisations may leave readers not familiar with the phenomenological method wondering what the use or worth of such a study is. Spinelli, in arguing the case for the phenomenological method, points out that "…although there may well be a substantial degree of 'sharability'…", ultimately it is the uniqueness in each individual's experience that matters (1989: 14). He argues further that it is the traditional focus on shared features in experimental research that has led to the importance of "unshared

variables in experience" being either "dismissed or diminished" (1989: 14). It is precisely these "unshared variables in experience" that phenomenologists emphasize: "It is not because unique factors in themselves hold greater significance; phenomenologists are simply redressing the balance, and in so doing, are increasing the adequacy of our theories" (1989: 14). So, while some may argue the lack of generalisability to be a flaw in phenomenological research, I accede only that it is a limitation.

If the lack of generalisability is a limitation of phenomenology, then its ability to "redress the balance" by focusing on the unique, redeems it. This study has done just that on two counts: on two issues the generalizations in theory are not borne out in the experience of the students in this study. The first is the linking of multiple identities with alienation or inner conflict, and the second, the assumed high level of awareness on the part of the student of social interaction or cognitive processing in academic writing.

In making this claim, I am mindful of Petersen's injunction to "tentativeness, humility, and critical peer review" (1994: 177), and his advice to phenomenological researchers not to assume an antagonistic stance to mainstream research (1994: 179). As regards the latter, I have already indicated my belief that phenomenological research does not oppose or demonize other approaches, but positions itself as a counterpoint, as Spinelli says, an attempt to "redress the balance" or "increas (e) the adequacy of our theories"(1989: 14). As regards the former – the injunction to tentativeness, humility and critical peer review – I have attempted to use language that reflects my tentativeness, and by so doing not to claim the legitimacy that more categorical claims imply (Petersen 1994: 184). I am aware that my data differ from established theories that are widely used to support research and teaching. This leaves me in somewhat of a dilemma: if it was because of my questions - a vague sense of unease even – about students' experience and theoretical accounts that I undertook this study, why should the difference in my students' experiences from the generalized theoretic accounts leave me again with a vague sense of unease? Having gained access to what lies beyond the scope of empirical inquiry (Van der Mescht 1996: 185) because I felt that empirical inquiry is inadequate for revealing what I seek, I am again left wondering: but can this be?

The burden of responsibility I first experienced when I began transforming the data, but which I overcame when I realized that by remaining true to the data I could proceed, now returns. What I have said in chapters six and seven is open to scrutiny – it must withstand critical peer review. And again, my only recourse is my fidelity to the data, my rigor. I have made no pretence of being objective in a traditional sense, my interest in this study comes from my experience and knowledge of twelve years of reading and teaching, twelve years that have seen a significant transformation of higher education in South Africa – a transformation of which I too am part. As researcher attempting to bracket or suspend my suppositions I am aware that Polanyi's observation I used in my analysis of the students' knowing applies also to me:

> Into every act of knowing there enters a vital contribution of the person knowing what is being known, … this coefficient is no mere imperfection but a vital component of (her) knowledge.
>
> (Polanyi in Emig 1977: 126)

As phenomenologist I am committed to the process of reduction, of the need to suspend my *a priori* notions, and yet this is not totally possible. Reduction is not to be taken at face value – not to be understood as saying that I am able to approach my data without knowing. I understand reduction to begin as a responsibility to declare my "cargo of pre-conception" (Petersen 1994: 180), rather than a claim to have cast off all pre-conceptions and so attempt to pass through the nothing-to-declare channel. But reduction is ongoing, and also entailed surrendering myself to the data, allowing myself to be led by the data, despite the sometimes "overwhelmingly strong" inclinations to interpret it in terms of my *a priori* notions (Van der Mescht 1996: 184). The reduction is not an easy attitude to master, but essential to ensure the rigor of the study, for: "the phenomena to be studied have to be described precisely as they present themselves, neither adding to nor subtracting from what is given" (Giorgi 1994: 206).

To achieve this meant that I had to ensure that the initial questionnaires and the interviews did not prejudice the data in anyway: not to ask about what I thought (in

terms of my experience and theoretical understanding) the students wanted to tell me, but to be totally open in my approach to what they had to say of their experiences. And then again, having transcribed the interviews, to work with the data in a manner that did not prejudice the parts that did not resonate with my experience and theoretical understanding, but through a process of horizontalization to include all that was meaningful to the students, even if it left me with contradictory experiences. I offer as evidence of my rigor the inclusion of student experiences that are unexpected in terms of mainstream theory or common knowledge in the field: the manner in which the black women cope in engineering; the incorporation of Muslim principles into industrial engineering theory; the blatant copying and mindless chore approach evident in their assignment writing. While many student experiences are expected, and even predictable (their experience of change being gradual, their experience of confidence resulting from a successful performance, their sense of being judged, their experience of engineering as a male domain), some of what has emerged from this study has been surprising, even sobering. It is the surprising and sobering insights that justify my choice of phenomenology.

The interviews were a crucial step in the process, for if I had indicated to the students what I was hoping or expecting to find, their responses would have been different, and my understanding based on that data would have been very different too. I prepared for the interviews by familiarizing myself with the students' questionnaire responses, and by careful readings of Kvale (1996) and Mishler (1986). As I had never taught any of the participants and we would meet for the first time in the interviews, I was aware of my position as outside researcher asking for their time and confidentiality.

I tried - for as far as this is possible in a researcher/researched relationship – to approach the interviews as conversation in which we were equal partners. To foster a sense of parity, I shared my conviction with the students that because I'm a lecturer and they are students they know better than I do what we would be talking about: what it means to a student to acquire the discourse of engineering. In the same way that Angelil-Carter (1997) describes her student participant "acquiring the skeptron" when the discussion in

the interview shifted to a topic about which he knew more than she did, I hoped that my participants would feel that I was passing them the skeptron. They knew more and better than I did what we would be discussing in the interviews. My part in the interviews was to respond by probing experiences the students introduced. I introduced topics or changed the direction of the discussion less often than I had anticipated I would need to, as the students were forthright. The result was that the interviews yielded experiences not typical of those described in theory. Looking back at my reflections immediately after the interviews I recall feeling disappointed. I later realized that what was disappointing me was precisely what made the interviews such a rich source.

My immediate disappointment came from what had not happened in the interviews: I kept thinking: 'I should have asked this' and, 'I forgot to ask that'. Some interviews left me quite despondent - and my despondency grew as I began transcribing. The students were talking about a variety of experiences, but so few seemed relevant to discourse acquisition. The transcribing took hours and felt to me like wasted hours, for as I transcribed alternative responses – things I felt I should have asked, but did not - kept coming to me. Gradually my frustration at my passive role in the interview and all the unfocused irrelevant student description grew to a point where I felt I needed a second round of interviews. Fortunately, in discussing my transcripts with my supervisor I came to realize that my frustration and disappointment was not a bad thing after all. The naïve description of students uninhibitedly sharing their experiences of acquiring the discourse of engineering would seem precisely as unfocused irrelevant description to a first time phenomenologist. I found it frustrating and disappointing only because I had not yet fully let go of 'old faithful'- the "homogenizing categories' (Thesen 1997: 505). Familiar and comforting, "homogenizing categories" are the conventional researcher's universal conceptual tool. I had discovered what it means to approach the phenomenon in "conceptual silence" (Stones 1988: 142).

8.3 Suggestions for future research

In proposing suggestions for future research it is necessary to heed what both Giorgi (1994) and Petersen (1994) say of phenomenological research. Giorgi defends phenomenological research from being relegated to "exploratory research", its legitimacy lying only in revealing what is important about the phenomenon so that traditional approaches can be accurately focused for more substantial research (1975: 210). Petersen reminds the phenomenological researcher of the need for humility and tentativeness (1994: 177). So it is with confidence and modesty that I embark on this final section.

Phenomenology, like any other method, cannot claim to offer more than a partial understanding of the phenomenon or subject under investigation. It forms part of a complex suite, for as Wertz points out "multiple and varying" perspectives and "focused reviewing of research findings are necessary until there is 'persistence of meaning through factual variations'" (Wertz in Petersen 1994: 185). Just as a phenomenological researcher applies horizontalization to the phenomenon being investigated, I believe the principle of horizontalization serves also as a means for conceptualizing how any particular study is situated in the wider field: it is but one horizon, or one way of looking at the phenomenon, and there are ever more and different perspectives to explore and consider in the search for clarity.

My investigation of students' experience of discourse acquisition is not uninterested. I am a lecturer: my understanding of the students' experience informs my teaching. This study is however, but one horizon, it does not offer a comprehensive or final understanding of the complex process and/or social action that discourse acquisition is.

As a phenomenological study of students' experience of discourse acquisition it prompts an obvious area for future research: lecturers' experience of facilitating the students' discourse acquisition. I say this is obvious because no matter where one stands on the

cognitive process/social action continuum, it is undeniable that lecturers are intimately involved in students' acquisition of engineering discourse. But as is evident from student experiences in this study, students' experiences are not isolated from lecturers' actions and beliefs. As Moore's respondent indicated, some lecturers feel "there is nothing we can do" (1998: 88): an investigation of lecturers' experience would be insightful.

Lortie (1975) argues that the single biggest influence on how a teacher teaches is his or her own experience as a learner. In the current South African situation where lecturers are almost exclusively white and schooled in privilege, and students predominantly black and newly arrived in a historically white institution from inferior schools, there may be a distance between learning and teaching if lecturers' teaching is strongly influenced by their own experiences as learners. Just as a better understanding of students' experiences may improve our teaching, a better understanding of our own experiences may too. I believe such an investigation is very necessary in the current context. While higher education in South Africa has since the mid-eighties been looking at ways to improve or upgrade students so that they fit the taken for granted assumptions of lecturers and institutions, there has been a recent shift from the 'deficit student' mindset, to looking critically at what lecturers and institutions do. A phenomenological investigation of lecturers' experience of students' discourse acquisition may add to that critical appraisal.

The difference in students' experience of assignment writing and report writing also needs further research. It seems as if students perceive report writing as part of the discourse of engineering, but assignment writing not. It is perceived merely as a means to an end. The implication of this is that assignment writing does not contribute in a meaningful way to their learning, although it does contribute to their passage through the system. That is, it has strategic value in higher education, but no inherent value. Their difference in experience of report and assignment writing, points to an experience of two discrete discourse communities: the academic community and the engineering community. That these are two distinct discourse communities is undeniable, but that in engineering education they are related, is also undeniable. Academic discourse is the portal through which aspiring engineers gain access to the profession; it is part of a

"seamless credentialing sequence" (Geisler 1994: 82). This stance also underpins the functioning of the Engineering Council of South Africa, and it is apparent in their policy document that the academic community is linked seamlessly to the engineering community. The criteria they use in accrediting higher education qualifications in engineering are "based on the understanding of experienced engineering practitioners of what was provided, what is necessary to do the work …and what is required by the industry served (ECSA 1999: 1). Such a statement clearly shows the seamless link between the academic community and the engineering community. If however, as it seems from this study, students do not experience their sojourn in the academic community as part of a "seamless sequence" but rather as a discrete task to be accomplished, then it is possible that engineering education as envisaged by the ECSA and the institution itself, is not running according to plan. This warrants further research.

Another area of research suggested by the students' different experiences of assignment writing and report writing is their understanding and use of genre. Such research would focus on what a phenomenological study such as this deliberately avoids: a consideration of what they are 'really' or 'actually' doing – as established by linguists through an analysis of texts. This would necessitate, as Bazerman proposes, that linguists "unpack the entire transaction and identify what the words are doing in the middle" (1988: 10). Such research is being undertaken, (Cleary 2000, Goodier 2000 pers.comm.) and, when read in conjunction with a study such as this, serves as a "multiple and varying perspective", and so contributes to the accumulation of research until there is "persistence if meaning through factual variations" (Wertz in Petersen 1994: 185).

The students' apparent experience of language as something separate and separable from content or meaning needs further investigation. It was not made explicit by students – in fact, it was one of the areas that caused my despondency while transcribing. I had deliberately not raised it in the interviews because I did not want the students to feel I wanted them to talk about language. We had agreed to talk about how they experienced acquiring the discourse of engineering, and for me as language teacher to ask specifically about language may have prejudiced the outcome. Nonetheless, their perceptions are

implicit in what they have said about their writing and their perceptions of what matters to lecturers. This separation represents a significant deviation from what is acceptable in theory – irrespective of where the theory is situated on the cognitive process/ social action continuum. The inseparability of language and the meaning of the content is the assumed basis of all debate on writing and discourse acquisition. That this should apparently not be so in the experiences of the students must be investigated further.

I would also suggest that the question not asked in a phenomenological study be pursued: the question of why. Why do the students not experience the inner struggle and alienation evident in other research and theories? Why do students have a "mindless chore" approach to assignment writing, but a more adequate and responsible approach to report writing? I have touched very briefly on both these questions – offering the transformation of higher education and society generally as a possible reason for the lack of alienation and inner struggle, and the students' perception that lecturers rate writing as relatively unimportant as a possible reason for the students' approach to assignment writing. These reasons were hinted at in the students' descriptions, my offering of possible reasons is speculative, circumstantial almost, for it is based only on the context in which students located their experiences. For anyone wishing to make changes to the curriculum - be it to course design, teaching or assessment – further exploration of why students seem to experience their discourse acquisition as such would be necessary.

I have found a phenomenological approach insightful and appropriate, and suggest finally that the use and value of the phenomenological method in educational research itself be researched. Not to use and value phenomenological research in education would be to deny the autonomy of the experiencing individual, and amount to giving the researcher more control over the lives of individuals and communities than what is appropriate.

References

Amos, T.L. 1999. Integrating the development of academic literacy into mainstream teaching and learning. South African Journal of Higher Education 13 (3), 177-183.

Amos, T.L. & Fischer, S. 1998. Understanding and responding to student learning difficulties within the higher education context: a theoretical foundation for developing academic literacy. South African Journal for Higher Education 12(2), 17 –23.

Angelil-Carter, S. 1995. Uncovering plagiarism in academic writing: Developing authorial voice within multivoiced texts. Unpublished master's dissertation, Rhodes University. Grahamstown, South Africa.

Angelil-Carter, S. 1997. Second language acquisition of spoken and written English: Acquiring the skeptron. TESOL Quarterly 31 (2), 263-287.

Applebee, A. 1986. Problems in process approaches: Towards a reconceptualization of process instruction. In A. Petrosky & D. Bartholomae (Eds.), The teaching of writing. Eighty fifth yearbook of the National Society of the Study of Education. (pp.95 – 113), Chicago: University of Chicago Press.

Badat, S., Volpe, H. & Barends, Z. 1994. The post-secondary education system: Towards policy formulation for equity and development. In B. Kaplan (Ed.), Changing by degrees? Equity issues in South African tertiary education. (pp.75-90), Cape Town: Cape Town University Press.

Ball, C.C, Dice, L. & Bartholomae, D. 1990. Telling secrets: Student readers and disciplinary authorities. In R. Beach & S. Hynds, Developing discourse practices in adolescence and adulthood. (pp.337-358), Norwood NJ: Ablex Publishing Corporation.

Ballard, B. & Clanchy, J. 1988. Literacy in the university: An 'anthropological' approach. In G. Taylor, B. Ballard, V. Beasley, H. Bock, J. Clanchy & P. Nightingale, Literacy by Degrees. (pp.7-23), Milton Keynes: Society for Research into Higher Education.

Bandura, A. 1986. Social foundations of thought and action. A social cognitive theory. Englewood Cliffs NJ: Prentice-Hall.

Barnes, D. & Barnes, D. 1990. Reading and writing as social action. In R. Beach & S. Hynds (Eds.), Developing discourse practices in adolescence and adulthood. (pp.34 –64), Norwood, NJ: Ablex.

Bartholomae, D. 1986. The teaching of writing. In A. Petrosky & D. Bartholomae, (Eds.), The teaching of Writing . Eighty-fifth yearbook of the National Society for the Study of Education. (pp.3 -7), Chicago: University of Chicago Press.

Bartholomae, D. 1988. Inventing the university. In E. R. Kintgen, B. M. Kroll and M Rose (Eds.), Perspectives on literacy. (pp.273-285), Carbondale, Il: Southern Illinois University Press.

Bazerman, C. 1981. What written knowledge does: Three examples of academic discourse. In Philosophy of the Social Sciences 11, 361-387.

Bazerman, C. 1985. Physicists reading physics. Written Communication 2 (1), 3-23.

Bazerman, C. 1988. Shaping written knowledge: The genre and activity of the experimental article in science. Madison: University of Wisconsin Press.

Bazerman, C. 1991. Introduction. In C. Bazerman & J. Paradis (Eds.), The textual dynamics of the professions. (pp.3-10), Madison: University of Wisconsin Press.

Bazerman, C. & Paradis, J. (Eds.) Textual dynamics of the professions. Madison: Wisconsin University Press.

Beach, R. & Hynds, S. 1990. Introduction: A model of discourse development. In R. Beach & S. Hynds, Developing discourse practices in adolescence and adulthood. (pp.3-33), Norwood, NJ: Ablex Publishing Corporation.

Becher,T. 1981. Towards a definition of disciplinary culture. Studies in Higher Education 6 (2), 109-122.

Becher, T. 1987. Disciplinary discourse. Studies in Higher Education 12 (3), 261-274.

Bereiter, C. & Scardamalia, M. 1985. Cognitive coping strategies and the problem of "inert knowledge". In S. Chipman, J. Segal & R. Glaser, Thinking and learning skills Volume 2: Research and open questions. (pp.65-80), Hillsdale NJ: Lawrence Erlbaum Associates.

Bereiter, C. & Scardamalia, M. 1985. Development of dialectical processes in composition. In D. Olsen, N. Torrence & A. Hildyard, Literacy, language and learning: The nature and consequences of reading and writing. London: Cambridge University Press.

Bereiter, C. & Scardamalia, M. 1989. Intentional learning as a goal of instruction. In L. Resnick (Ed.), Knowing, learning and instruction: Essays in honour of Robert Glaser. Hillsdale, NJ: Erlbaum.

Berkenkotter, C. & Huckin, T.N. 1993. Rethinking genre from a sociocognitive perspective. Written Communication 10 (4), 475-509.

Berkenkotter, C. & Huckin, T.N. 1995. Genre knowledge in disciplinary communication: Cognition/culture/power. Hove: Lawrence Erlbaum Associates.

Berkenkotter, C., Huckin, T.N. & Ackerman, J. 1991. Social context and socially constructed texts. The initiation of a graduate student into a writing research community. In C. Bazerman & J. Paradis (Eds.), Textual dynamics of the professions. Madison: Wisconsin University Press.

Biggs, J. 1996. Enhancing teaching through constructive alignment. Higher Education 32, 347-364.

Bizzel, P. 1978. The ethos of academic discourse. College Composition and Communication (29), 351-355.

Bizzel, P. 1982a. Cognition, convention and certainty: What we need to know about writing. PRE/TEXT 31(3), 213-243.

Bizzel, P. 1982b. College Composition: Initiation into the Academic Discourse Community. Curriculum Inquiry 12 (2), 191-207.

Bizzel, P. 1986. Composing processes: An overview. In A. Petrosky & D. Bartholomae, (Eds.), The teaching of writing. Eighty-fifth yearbook of the National Society for the Study of Education. Chicago: University of Chicago Press.

Bloom, B.S. 1965. A taxonomy of educational objectives handbook I: Cognitive domain. (2nd ed.). New York: McKay.

Boughey, C. 1996. Reflections in the tea-room. University of Zululand. Unpublished paper.

Boughey, C. 1997. Multiple metaphors in an understanding of the acquisition of academic literacy. University of Zululand: Unpublished paper.

Boughey, C. 1998. Language and "disadvantage" in South African institutions of higher education: implications of critical challenges to second language acquisition discourse for academic development practitioners. South African Journal of Higher Education 12 (1), 166-173.

Bourdieu, P. 1977. Outline of a theory of practice. Cambridge: Cambridge University Press.

Braine, G. 1995. Writing in the natural sciences and engineering. In D. Belcher & G. Braine (Eds.), Academic writing in a second language. Essays on research and pedagogy. (pp.113 –134), Norwood, NJ: Ablex.

Britton, J., Burgess, T., Martin, N., McLeod, A. & Rosen, H. 1975. The development of writing ability. London: MacMillan.

Brown, G. (with Bull, J and Pendlebury, M.). 1997. Assessing student learning in higher education. London: Routledge.

Bruffee, A. 1984. Collaborative learning and the "conversation of mankind". College English 46, 635 – 652.

Canagarajah, S.A. 1999. Resisting linguistic imperialism in English teaching. Oxford: Oxford University Press.

Chiseri-Strater, E. 1991. Academic literacies. The public and private discourse of university students. Portsmouth, NH: Boynton/Cook.

Christie, F. 1991. First- and second-order registers in education. In E. Ventola (Ed.), Functional systemic linguistics. (pp.235-256), Berlin: Mouton de Gruyter

Cleary, S.L. 2000, November. Language and reports. Research and practice in professional discourse. City University of Hong Kong.

Cliff, A. 1995. A qualitative review of study behaviour before and during the first year of engineering studies. Higher Education 29, 169-181.

Cole, M. 1993. Conclusion. In L.B. Resnick, J.M. Levine & S.D. Teasley (Eds.), Perspectives on socially shared cognition. Washington: American Psychological Association.

Colaizzi, P.F. 1978. Psychological research as the phenomenologist views it. In R.S.Valle & M. King (Eds.), Existential-Phenomenological alternatives for psychology. (pp.48-71), New York: Oxford University Press.

Cooper, M.M. 1990. The answers are not in the back of the book: Developing discourse practices in first year English. In R. Beach & S. Hynds, Developing discourse practices in adolescence and adulthood. (pp.65 - 90), Norwood NJ: Ablex Publishing Corporation.

Courage, R. 1993. The interaction of public and private literacies. College Composition and Communication 44 (4), 484 – 498.

Craig, A.P. 1996. Education for all. South African Journal of Higher Education 10 (2), 47 – 55.

Cummins, J. 1984. Wanted: A theoretical framework for relating language proficiency to academic achievement among bilingual students. In C. Riveria (Ed.), Language proficiency and academic achievement. (pp.2-19), Clevedon: Multilingual Matters.

Cummins, J. & Swain, M. 1983. Analysis-by-rhetoric: Reading the text of the reader's own projection? A reply. Edelsky *et al*. Applied Linguistics 4 (1), 23-39.

Cummins, J. & Swain, M. 1986. Bilingualism in education. Aspects of theory, research and practice. London: Longman.

Denzin, N. K. & Lincoln, Y. S. (Eds.). 1998. Strategies of qualitative inquiry. Thousand Oaks: Sage.

Dison, A., Alfers, H. & Wendelaar, F. 1999. Breaking boundaries: Facilitating conceptual development in an EAP course. Discourse 10(1), 22 –37.

Eggins, S. 1994. An introduction to systemic functional linguistics. London: Pinter.

Elbow, P. 1973. Writing without teachers. Oxford: Oxford University Press.

Elbow, P. 1998. Writing with power. Techniques for mastering the writing process. (2nd ed.). New York: Oxford University Press.

Ellsworth, E. 1989. Why doesn't this feel empowering? Working through the repressive myths of critical pedagogy. Harvard Educational Review 59(3), 297 –324.

Emig, J. 1971. The composing processes of twelfth graders. Urbana, Il: National Council of Teachers of English.

Emig, J. 1977. Writing as a mode of learning. College Composition and Communication 23, 122- 128.

Engineering Council of South Africa. 2000. Guideline for the accreditation of technikon qualifications in engineering. Unpublished document Engineering Council of South Africa. Yeoville.

Engineering Council of South Africa. (no date) Policy statement R1/1 Unpublished document Engineering Council of South Africa. Yeoville.

Entwistle, N. 1987. Styles of learning and teaching. (2nd ed.). Chichester: Wiley.

Entwistle, N. 1995. Frameworks for understanding as experienced in essay writing and in preparation for examinations. Educational Psychologist 30 (1), 47-54.

Entwistle, N. & Ramsden, P. 1983. Understanding student learning. London: Croom Helm.

Entwistle, N. J. & Tait, H. 1990. Approaches to learning, evaluations of teaching, and preferences for contrasting academic environment. Higher Education 19, 169 – 194.

Farber, M. 1966. The aims of phenomenology. New York: Harper & Row.

Faigley, L. 1986. Competing theories of process: A critique and a proposal. College Composition and Communication 48, 527 – 542.

Fairclough, N. 1989. Language and power. Harlow: Longman.

Fairclough, N. 1992. Discourse and social change. Cambridge: Polity Press.

Fleming, W.G. 1986. The Interview: a neglected issue in research on student learning. Higher Education 15, 547-563.

Flower, L. 1979. Writer-based prose: A cognitive basis for problems in writing. College English 41 (1), 19-37.

Flower, L. 1981. Problem-solving strategies for writing. New York: Harcourt Brace Jovanovich.

Flower, L. 1988. The construction of purpose in writing and reading. College English 50, 528 – 550.

Flower, L. 1990. Negotiating academic discourse. In L. Flower, V. Stein, J. Ackerman, M. J. Kantz, K. McCormick, W.C. Peck, Reading-to-write: Exploring a cognitive and social process. (pp.221-252), New York: Oxford University Press.

Flower, L. 1990. The Role of Task Representation in Reading-to-Write. In L. Flower, V. Stein, J. Ackerman, M. J. Kantz, K. McCormick, W.C. Peck, Reading-to-write: Exploring a cognitive and social process. (pp.35-75), New York: Oxford University Press.

Flower, L. 1994. The construction of negotiated meaning. A social cognitive theory of writing. Carbondale: Southern Illinois University Press.

Flower, L. & Hayes, J.R. 1977. Problem solving strategies and the writing process. College English 39, 449- 461.

Flower, L. & Hayes, J.R. 1980. The cognition of discovery: Defining a rhetorical problem. College Composition and Communication 31 (2), 21-32.

Flower, L. & Hayes, J.R. 1981. A cognitive process theory of writing. College Composition and Communication 32, 365-387.

Flower, L. & Hayes, J.R. 1981. Plans that guide the composing process. In C.H. Fredriksen & J.F. Dominic (Eds.), Writing: The nature development and teaching of written communication. (pp.39- 58), Hillsdale, NJ: Erlbaum.

Flowerdew, J. & Miller, L. 1995. On the notion of culture in L2 Lectures. TESOL Quarterly 29 (2), 345- 373.

Foucault, M. 1969. The archaeology of knowledge. London: Tavistock.

Frank, M. 1992. On Foucault's concept of discourse. In T.J. Armstrong (translator) Michel Foucault philosopher. (pp.99-116), New York: Harvester Wheatsheaf.

Freedman, A. 1995. Anyone for tennis? In A. Freedman & P. Medway (Eds.), Genre and the new rhetoric. (pp.43- 65), London: Taylor and Francis.

Gage, J.T. 1986. Why write? In A. Petrosky & D. Bartholomae (Eds.), The teaching of Writing. Eighty-fifth yearbook of the National Society for the Study of Education. Chicago: University of Chicago Press.

Gee, J.P. 1990. Social linguistics and literacies: Ideology in discourses. London: The Falmer Press.

Gee, J.P. 1996. Social linguistics and literacies: Ideology in discourses (2nd ed.). London: The Falmer Press

Geisler, C. 1994. Academic literacy and the nature of expertise: Reading writing and knowing in academic philosophy. Hillsdale, NJ: Lawrence Erlbaum and associates.

Gere, A. R. 1986. Teaching writing: the major theories. In A. Petrosky & D. Bartholomae (Eds.), The teaching of writing. Eighty-fifth yearbook of the National Society for the Study of Education. (pp.30-70), Chicago: University of Chicago Press.

Giorgi, A. 1979. The relationships among level, type, and structure and their importance for social science theorizing: A dialogue with Schutz. In A. Giorgi, R. Knowles & D.L. Smith (Eds.), Duquesne Studies in Phenomenological Psychology Volume III. (pp.81-92), Pittsburgh: Duquesne University Press

Giorgi, A. 1984. Toward a phenomenologically based unified paradigm for psychology. In D. Kruger (Ed.), The changing reality of modern man. (pp.20 – 34), Cape Town: Juta.

Giorgi, A. 1985. Sketch of a psychological phenomenological method. In A.Giorgi, Phenomenology and psychological research. (pp.8 - 22), Pittsburgh, PA: Duquesne University Press.

Giorgi, A. 1985. The phenomenological psychology of learning and the verbal learning tradition. In A.Giorgi, Phenomenology and psychological research. (pp.23-85), Pittsburgh, PA: Duquesne University

Giorgi, A. 1992. Description versus interpretation: competing alternative strategies for qualitative research. Journal for Phenomenological Psychology 23 (2), 119-135.

Giorgi, A. 1994. A phenomenological perspective on certain qualitative research methods. Journal of Phenomenological Psychology 25 (2), 190-220.

Goffman, E. 1969. The presentation of self in everyday life. (2nd ed.). London: Penguin.

Goodier, C. (2000, 26 August). Head of Department Academic Development, Port Elizabeth Technikon, Port Elizabeth. Personal communication

Grabe, W., & Kaplan, R. B. 1996. Theory and practice of writing. An applied linguistic perspective. London: Longman.

Graves, D. 1983. Writing: Teachers and children at work. London: Heinemann.

Halliday, M.A.K. 1996. Literacy and linguistics: a functional perspective. In R. Hasan and G. Williams (Eds.), Literacy in society. (pp.339 - 376), London: Longman.

Halliday, M.A.K. & Hasan, R. 1989. Language, context and text. London: Oxford University Press.

Halliday, M. A. K. & Martin, J. R. 1993. Writing science: Literacy and discursive power. London: The Falmer Press.

Hayes, J.R. & Flower, L.S. 1983. Uncovering cognitive processes in writing: An introduction to protocol analysis. In P. Mosenthal, L. Tamor & S. A. Walmsley, (Eds.), Research on writing. Principles and methods. (pp.207-220), New York: Longman.

Hintikka, J. 1995. The phenomenological dimension. In B. Smith & D.W. Smith (Eds.), The Cambridge companion to Husserl. (pp.78 - 105), Cambridge: Cambridge University Press.

Herrington, A.J. 1985. Writing in Academic settings: A study of the contexts for writing in two college chemical engineering courses. Research in the Teaching of English 19 (4), 331 –361.

Honderich, T (Ed.). 1995. The Oxford companion to philosophy. Oxford: Oxford University Press.

Horowitz, D. 1986. Process, not product: Less than meets the eye. TESOL Quarterly 20(1), 141 – 144.

Hull, G. & Rose, M. 1990. Towards a social-cognitive understanding of problematic reading and writing. In A.A. Lunsford, H. Moglen & J. Slevin (Eds.), The Right to Literacy. (pp.235-244), New York: The Modern Language Association of America.

Hutchings, C. 1998. Transitional barriers and contextual gaps. In S. Angelil-Carter (Ed.), Access to success. Literacy in academic contexts. (pp.103 – 119), Cape Town: University of Cape Town Press.

Ivanic, R. 1998. Writing and identity. The discoursal construction of identity in academic writing. Philadelphia, PA: John Benjamins Publishing Company.

Johns, A. M. 1995. Teaching classroom and authentic genres: Initiating students in academic cultures and discourses. In D. Belcher & G. Braine (Eds.), Academic writing in a second language. Essays on research and pedagogy. (pp.277 –292), Norwood, NJ: Ablex.

Kapp, R. 1998. Language, culture and politics: The case for multilingualism in tutorials. In S. Angelil-Carter (Ed.), Access to success: Literacy in academic contexts. (pp.21 – 35), Cape Town: University of Cape Town Press.

Knight, P. (Ed.). 1995. Assessment for learning in higher education. London: Kogan Page.

Knoblauch, C.H. & Brannon, L. 1983. Writing as learning through the curriculum. College English 45, 465- 474.

Kockelmans, J.J. (Ed.). 1967. Phenomenology. The philosophy of Edmund Husserl and its interpretation. New York: Doubleday.

Kolb, D. 1984. Experiential learning: Experience as a source of learning. Englewood Cliffs, NJ: Prentice Hall.

Kotchecha, P. & Rutherford, M. 1991. A case for team-teaching language and communication in science and engineering. South African Journal of Higher Education 5 (2), 100 – 106.

Kress, G. 1989. Linguistic processes in sociocultural practice. Oxford: Oxford University Press.

Kruger, D. 1988. An introduction to phenomenological psychology (2nd ed.). Cape Town: Juta.

Kroll, B. (Ed.). 1990. Second language writing. Cambridge: Cambridge University Press.

Kvale, S. 1996. InterViews. An introduction to qualitative research interviewing. Thousand Oaks: Sage.

Leibowitz, B. 1994. A Revealing correspondence: Research into students' learning and

writing in the first year history course. AD Dialogues 2, 117-136.

Leki, I. 1992. Understanding ESL writers: A guide for teachers. London: Heinemann.

Leki, I. 1995. Academic Writing. Exploring processes and strategies (2nd ed.). New York: St. Martins Press.

Leki, I. 1995. Coping strategies of ESL students in writing tasks across the curriculum. TESOL Quarterly 29(2), 235-260.

Leki, I. 1997. "Completely different worlds": EAP and the writing experiences of ESL students in University Courses. TESOL Quarterly 31(1), 39-69.

Lemke, J.L. 1993. Talking Science: Language, learning, and values. Norwood: Ablex.

Lemke, J. L. 1995. Textual Politics: Discourse and social dynamics. London: Taylor & Francis.

Lincoln, Y.S. & Guba, E.G. 1985. Naturalistic inquiry. Newbury Park, CA: Sage.

Lortie, D. 1975. School teacher: A sociological study. Chicago: Chicago University Press.

Luckett, K. 1995. National additive bilingualism: Towards a language plan for South Africa. In K. Heugh, A. Siegruhn & P. Pluddermann, Multilingual education for South Africa. (pp.73 – 78), Johannesburg: Heinemann.

MacCrorie, K. 1980. Searching writing. Upper Montclair, NJ: Boynton Cook.

Mail and Guardian 2000 21 July No.16 Vol. 29 p21.

Martin, D. 1999. Identity, culture, pride and conflict. In S. Bekker & R. Prinsloo (Eds.), Identity? Theory, politics, history. (pp.187 – 200), Pretoria: HSRC Press.

Martin, J.R. 1985. Factual writing: exploring and challenging social reality. Oxford: Oxford University Press.

Martin, J. 1993. Life as a noun. In M.A.K. Halliday & J. Martin, Writing science: Literacy and discursive power. London: The Falmer Press.

Marton, F. & Saljo, R. 1976a. On qualitative differences in learning: I – Outcome and process. British Journal of Educational Psychology 46, 4-11.

Marton, F. & Saljo, R. 1976b. On qualitative differences in learning: I – Outcome as a function of the learner's conception of the task. British Journal of Educational Psychology 46, 115-127.

Mathes, J. C. & Stevenson, D.W. 1976. Completing the bridge: Report writing in 'real life' engineering courses. Engineering Education November, 154 – 158.

Meyer, J.H.F. 1988. Student perceptions of learning contexts and approaches to studying. South African Journal of Higher Education 2, 73-82.

Meyer, J.H.F. 1991. Study orchestration: the manifestation, interpretation and consequences of contextualized approaches to studying. Higher Education 22, 297-316.

Meyer, J.H.F, Dunne, T.T. & Sass, A.R. 1992. Impressions of disadvantage: I – school versus university study orchestration and consequences for academic support. Higher Education 24, 291-316.

Meyer, J. H. F. & Muller, M. W. 1990. Evaluating the quality of student learning. I – an unfolding analysis of the association between perceptions of learning context and approaches to studying at an individual level. Studies in Higher Education 15 (2), 131 – 154.

Meyer, J.H.F, Parsons, P. & Dunne, T.T. 1990. Individual study orchestrations and their associations with learning outcome. Higher Education 20, 67- 89.

Miles, M.B & Huberman, A.M. 1994. An expanded sourcebook qualitative data analysis (2nd ed.). Thousand Oaks: Sage Publications.

Miles, M. B. & Huberman, A. M. 1994. Data management and analysis methods. In N.K Denzin & Y.S. Lincoln (Eds.), Handbook of qualitative research. (pp.428 – 444), Thousand Oaks: Sage.

Mishler, E.G. 1986. Research interviewing context and narrative. Cambridge MA: Harvard University Press.

Moffett, J. 1968. Teaching the universe of discourse. Boston: Houghton Mifflin Company.

Moore, R. 1998. How science educators construe student writing. In S. Angelil-Carter (Ed.), Access to success. Literacy in academic contexts. (pp.83 – 102), Cape Town: University of Cape Town Press.

Moore, R., Paxton, M., Scott, I. & Thesen, L. 1998. Retrospective: Language development initiatives and their policy contexts. In S. Angelil-Carter (Ed.), Access to success. Literacy in academic contexts. (pp.8 – 20), Cape Town: University of Cape

Town Press.

Morrow, W. 1993. Epistemological access. AD Issues 1, 3-5.

Moustakas, C.E. 1994. Phenomenological research methods. Thousand Oaks: Sage.

Murray, D. M. 1985. The essential delay: When writer's block isn't. In Rose, M. (Ed.), When a writer can't write. New York: Guilford Press.

Odell, L. & Goswami, D. 1982. Writing in a non-academic setting. Research in the teaching of English 16(3), 201-224.

Odell, L. 1980. The process of writing and the process of learning. College Composition and Communication 31, 42-50.

Paxton, M. 1998. Transforming assessment practices into learning processes. In S. Angelil-Carter (Ed.), Access to success. Literacy in academic contexts. (pp.136 –158), Cape Town: University of Cape Town Press.

Peirce, N. B. 1995. Social identity, investment, and language learning. TESOL Quarterly 29(1), 9 – 31.

Pennycook, A. 1989. The concept of method, interested knowledge, and the politics of language teaching. TESOL Quarterly 23 (4), 589 – 618.

Pennycook, A. 1994. The cultural politics of English as an international language. London: Longman.

Pennycook, A. 1996. Borrowing others' words: Text, ownership, memory and plagiarism. TESOL Quarterly 30(2), 201-230.

Perry, W.G. 1970. Forms of intellectual and ethical development in the college years. A scheme. New York: Holt, Reinhart & Winston.

Peterson, G. 1994. Challenges of qualitative inquiry and the need for follow-up in descriptive science. Journal of Phenomenological Psychology 25 (2), 174-189.

Polkinghorne, D. E. 1989. Phenomenological research methods. In R.S Valle & S Halling (Eds.), Existential-Phenomenological perspectives in psychology. Exploring the breadth of human experience. (pp.41 – 60), New York: Plenum Press.

Port Elizabeth Technikon. 1999. Port Elizabeth Technikon second three year rolling plan 2000-2002.

Power, R. 2000. A question of knowledge. Harlow: Prentice Hall.

Raimes, A. 1985. What unskilled ESL students do as they write: A classroom study of Composing. TESOL Quarterly 19 (2), 229-259.

Ramphele, M. 1994. Equity: Reality factors and their implications. In Kaplan, B (Ed.), Changing by degrees? Equity in South African tertiary education. (pp.91 - 100), Cape Town: University of Cape Town Press.

Ramsden, P. 1992. Learning to teach in higher education. London: Routledge.

Ramsden, P. & Entwistle, N. J. 1981. Effects of academic departments on students' approaches to studying. British Journal of Educational Psychology 51, 368-383.

Resnick, L.B., Levine, J.M. & Teasley, S.D. (Eds.). 1993. Perspectives on socially shared cognition. Washington: American Psychological Society.

Rogoff, B. 1990. Apprenticeship in thinking: Cognitive development in social context. New York: Oxford University Press.

Rogoff, B. & Lave, J. (Eds.). 1984. Everyday cognition. Cambridge, MA: Harvard University Press.

Rose, M. 1985. 1985 Complexity, rigor, evolving method and the puzzle of writer's block: Thoughts on composing process research. In M. Rose (Ed.), When a writer can't write: Studies in writer's block and other composing process problems. (pp.232 - 252), New York: Guilford.

Rubin, H. J. & Rubin, I. S. 1995. Qualitative interviewing. The art of hearing data. Thousand Oaks: Sage.

Schön, D.A. 1983. The reflective practitioner. London: Temple Smith.

Schön, D. A. 1987. Educating the reflective practitioner. San Francisco: Jossey-Bass.

Scribner, S. 1984. Studying working intelligence. In B. Rogoff & J. Lave (Eds.), Everyday cognition. It's development in social context. (pp.9 – 40), Cambridge, MA: Harvard University Press.

Scribner, S. 1988. Literacy in three metaphors. In E.R. Krintgen, B.M. Kroll, and M. Rose (Eds.), Perspectives on literacy. (pp.71 – 81), Carbondale, IL: Southern Illinois University Press.

Selzer, J. 1983. The composing processes of an engineer. College Composition and Communication 3(2), 178-187.

Shaughnessy, M. 1977. Errors and expectations. A guide for the teacher of basic writing. Oxford: Oxford University Press.

Sinclair Bell, J. 1995. The relationship between L1 and L2 literacy: Some complicating factors. TESOL Quarterly 29(4), 689 – 704.

Smith, B. & Smith, D.W. (Eds.). 1995. The Cambridge companion to Husserl. Cambridge: Cambridge University Press.

South Africa (Republic). 1959. Extension of University Education Act. Pretoria: Government Printer.

South Africa (Republic). 1983. Universities Amendment Act No.84. Pretoria: Government Printer.

South Africa (Republic). 1997. Higher Education Act No.101. Pretoria: Government Printer.

South Africa. 1998. Government Gazette regulations under the South African Qualifications Authority Act 58 of 1995. Pretoria: Government Printer.

Spack, R. 1988. Initiating ESL students into the academic discourse community: How far should we go? TESOL Quarterly 22(1), 29 –47.

Spiegelberg, H. 1975. Doing phenomenology: Essays on and in phenomenology. The Hague: Martinus Nijhoff.

Spinelli, E. 1989. The interpreted world. An introduction to phenomenological psychology. London: Sage.

Stewart, D. & Mickunas, A. 1990. Exploring phenomenology. A guide to the field and its literature. (2nd ed.). Athens: Ohio University Press.

Starfield, S. 1990. Science and Language: A new look at some old issues. South African Journal of Higher Education 4 (2), 84 – 89.

Street, B.V. 1984. Literacy in theory and practice. Cambridge. Cambridge University Press.

Stones, C.R. 1988. Research: Towards a Phenomenological Praxis. In D. Kruger, An introduction to Phenomenological Psychology. (pp.141-156), Cape Town: Juta.

Swales, J. M. 1990. Genre analysis. English in academic and research settings. Cambridge: Cambridge University Press.

Taylor, G. 1988. The literacy of knowing: Content and form in students' English. In G. Taylor, B. Ballard, V. Beasley, H. Bock, J. Clanchy & P. Nightingale, Literacy by Degrees. (pp.53-64), Milton Keynes: Society for Research into Higher Education.

Thesen, L. 1997. Voices, discourse, and transition: In search of new categories in EAP. TESOL Quarterly 31(3), 487-511.

Vale, R.S., King, M. & Halling, S. (Eds.). 1989. An introduction to existential-phenomenological thought in psychology. New York: Plenum.

Van den Berg, J. H. 1972. A different existence. Principles of phenomenological psychopathology. Pittsburgh: Duquesne University Press.

Van den Berg, J. H. 1972. Zien. Verstaan en verklaren van visuele waarneming. Pretoria: Van Schaik.

Van der Mescht, H. 1996. A phenomenological investigation into educational leaders' perceptions of themselves, their followers, and their organizational contexts. Unpublished doctoral thesis. Rhodes University, Grahamstown, South Africa.

Van Kaam, A. 1969. Existential foundations of psychology. New York: Image Books.

Van Vuuren, A & Pouris, A. 1992. Engineering education in South Africa: is it going the way it should? South African Journal of Science 88, 549- 551.

Vygotsky, L.S. 1962. Translated by Hanfmann, E. & Vakar, G. Thought and language. Cambridge: Massachusetts Institute of Technology.

Vygotsky, L. 1978. Mind in society. Cambridge: Harvard University Press.

Wankat, P.C & Oreovicz, F.S. 1993. Teaching engineering. New York: McGraw-Hill.

White, C. 1999. Gender identities and culture: Some observations from fieldwork in Soweto. In S. Bekker & R. Prinsloo (Eds.), Identity? Theory, politics, history. (pp.187 – 200), Pretoria: HSRC Press.

Zamel, V. 1987. Recent Research on writing pedagogy. TESOL Quarterly 22(3), 520 – 523.

Appendices: Natural Meaning Units

Colin

C1: We focus a lot on constraints. I suppose it's more in my actions and in my talking as well, I tend not to waffle any more. I tend to be direct to people, specially my actions as well -my mom says my room's a lot neater these days. I clean my car more often I've, I've just become a lot more organized person.	He is aware of thinking in terms of 'constraints'. This awareness goes beyond his thinking and filters into his actions and talking as well. He has become more direct with people, is more organized generally, and keeps his room neat and his car clean.
C2: I think it's actually more from my experiential year where I was working with engineers and in that sort of stressed environment, there's no time to waffle. You know you have to get to the point, the guys want details, definite details. That's all they want and that's where you pick it up.	He attributes this awareness to his experiential year where, because of the stress of the work environment there is no margin for waffle. He 'picked up' at work that 'definite details' are all that maters.
C3: When I came out of Aberdare Cables – well obviously, you work with a much lower class of people there. Really very uneducated – a lot of them don't have matric and you tend to pick up their type of talking. A lot of people said I was starting to talk like a coloured, for instance. And your way of thinking as well, is – well a lot less mature and when you finally come here you work with a different group of people. You tend to improve your level of, maturity, level of thinking to – almost, you know, match your surrounding people.	At Aberdare he worked among coloured people whom he regarded as lower and very uneducated. He was aware that he was starting to talk them. He feels his way of thinking there was also less mature. This changed when he left, because he believes that he tends to think in a manner that is appropriate to the environment, i.e. it matches that of the surrounding people.
C4: To realise you could go further too. I think I was under a lot of pressure and strain at Aberdare Cables. You just want to get out of there. You think to yourself, 'geez, if I could get the opportunity to get out of here I will'. And to this day when I'm studying as well, I still think to myself I never ever want to land in a position that I have to go to do a job like that again. And that has been a motivating factor for me I think.	He became aware that he could achieve more and wanted to leave as soon as he had the opportunity. He hopes never to have a job like that again, and the memory of that job serves as a motivating factor.

C5: There is naturally a bit (terminology). The lecturers talk a lot about it. So, er… obviously in the beginning you don't know what half the stuff is, and you pick it up along the way. [If I don't understand] then I go and ask my father! (both laugh)	There is also a bit of terminology used by the lecturers, which although unknown initially, he just 'picks up along the way'. He copes easily with new terminology as he just asks his father.
C6: [Writing with a computer] I'll use brackets and hyphens and things a lot more now. It's a lot more concise and direct. Where I never really used to, I sort of think a bit more about what goes here – what sort of, question marks, and… fullstops.	When using a computer to compose, he uses more punctuation marks to make his writing more direct. He now pays greater attention to textual conventions in his composition.
C7: I think when you come across as being, as being definite and concise, people see that you know what you are talking about. They can actually see that this oke knows what he's talking about. And you'll get a better response from people and you'll become a better leader I think as well. You know, your lower people.	Being definite and concise are important ways of showing others that he knows his field and has control of the subject. This allows him to establish an awareness of his superiority amongst subordinates, which he feels will get a better response from them and enable him to become a better leader.
C8: You need to do less uhming and ahing. That's one of the main things, uh, you have to talk, you have to be definite when you talk– also know what you're talking about.	He believes he needs to make his knowledge apparent to others by being definite. He tries to create an impression of certainty by controlling his use of speech stabilizers.
C9: [Knowledge] does [come into it] to an extent, ja. Not everyone can say bullshit as well as other people. I think some people don't want to appear stupid by not knowing something and they will try and bull shit their way through certain things, ja. It works if you're pretty good at it, ja.	Knowledge is necessary to create an impression of control, but he believes that being able to put the right 'spin' on things (saying bull shit well) allows someone to cover for what they don't know.
C10: I took a trip to Jo'burg. We had to go and do a productivity improvement there for two weeks. And there naturally you have to really think about what you are writing and put down the facts, and it must obviously be in a good order. Because that is going to be presented to the top level management and you know, you obviously don't want to look stupid so you have to think about what you are writing.	When he did a productivity improvement project in Jo'burg he was aware that his professional standing would be affected by his writing performance. He focused on logical organization thought carefully about his composition because it was going to be presented to management. It was important to demonstrate his knowledge through his writing.

C11: [Ordinarily] I suppose I'll, I'll be inclined to … just write, not really criticize myself and say, 'could you have said this a bit better? Cause when you are writing a real formal report, you'll go back and look at the paragraph. You'll criticize and see if you could have done improvements.	He is less inclined to think so carefully about his writing when producing lower profile documents. He then does not criticize his own writing, ponder options or make improvements.
C12: Those are people who might be responsible for your promotion one day. And they may judge you on the language you use when you write. And your spelling and abbreviations can tell a lot about you. At least they would think that, ja.	He feels his superiors have a judgmental role in reading his writing – to the extent that it may affect his promotion prospects. His concern with usage seems to be at the level of mechanics (of standard English).
C13: I think they (lecturers) should have a look at that. It doesn't need to be marked strictly, but they should at least … check the spelling because one day when you go into a job, and you've come from Technikon you should be the type of person who can write a good report. With as few grammatical errors as possible, and with good… skills, writing skills as well.	He feels lecturers should also consider spelling as it will ultimately reflect not only on the individual but also the institution. He believes graduates should be able to write a good report – which he characterizes by grammatical correctness and skilled writing. He seems less sure of what he means by the latter.
C14: They do [judge student writing] to an extent, but I get the feeling they are more interested in what you are saying - they are interested to know that you understand what you're saying and they'll like, they'll mark you well for that.	His impression of lecturers' values is that expression matters less than content. They are interested in the 'what' – and not the 'how'. Such a view implies that it is possible to separate discourse from knowledge.
C15: I suppose if … they ask you a question you need to know the points of the question. You need to … put down some facts, put down your own thoughts and in the end your spelling isn't too important there because they just really want to know for that question, if you know what you're talking about.	He feels that for lecturers putting down facts is more important that how he writes. He believes the purpose is only to demonstrate that he knows the content. He refers to writing in mechanical terms, rhetorical issues are not included.
C16: Other areas in life, where I'm more disciplined, I seem to have a, a low tolerance to people. I'm less tolerant of people these days because I expect certain things are the way they should be, certain	Being more disciplined generally has made him less tolerant of others. He expects things to be done the right way. He ascribes this to the course, saying he gets frustrated when things aren't done the right way.

things should be done this way and that's the only way. I assume it is because of the course, ja. And I do get frustrated when they aren't.	
C17: Especially when you're in a company and you're working on a multi-million rand project, you know there's just no room for error and you have to have that sort of thinking instilled.	Doing things the right way is particularly important to him in industry – by which time it should be instilled in him.
C18: I must say I learnt in industry. I had a mentor above me, I worked a lot with him. I suppose I tended to admire him a lot as well. He knew what he was talking about all the time. He was very concise and, he seems to be very confident as well. I tended to look at him and I thought to myself, 'that's the way I also want to be.' I need to have that behind me because I like getting the results that he gets.	He learnt a lot in industry largely because of his mentor whom he admired for his knowledge, conciseness and confidence. He remembers thinking that he wants to be like him and able to attain the same results.
C19: I remember the first day he actually took me around the factory. And I noticed that day how he greeted everybody and that they just tend to greet him back, and I'd never done that. And I actually started to do that and I could see the difference. And that is one thing that I picked up and I said to myself I have to start doing.	One of the many things that impressed him about his mentor was his manner of greeting all factory workers. He feels that he would not have done that himself, but then started to do it and noticed the difference in the way people responded to him. He thus acquired a social skills important in his profession from his mentor.
C: 20 If people look up to you I think they are more willing to, to work with you and help you in your projects that you do. And as an industrial engineer, you work a lot with people because you often have to follow processes, find improvements and things like that, and you need the peoples' feedback, and you need their co-operation.	He conceives of respect I terms of people looking up to him. He believes that if he can establish such respect, workers will co-operate with him in the various tasks he needs to perform.
C21: A lot of the things you do here in theory are not often the way they are done out there. We're taught here a lot to think in terms of the motor industry. A lot of us don't go into that industry, like me, I went into a pharmaceutical plant and there	He finds that the way things are done in theory in class are not the same as they are done in industry. The class focus is on the motor industry, which he found different to pharmaceutical industry where he was working.

things are run very differently in terms of engineering.	
C22: I flew there on the Monday morning. I was escorted into the board room and I was sitting there with all the managers and I was thinking, 'geez, here's me, a student.' And they all introduced them- selves and they sat down and they told me exactly what they wanted me to do. They wanted to know if I needed anything. I hadn't been put in that situation before.	He was once required to fly to East London where he was escorted to the boardroom to meet the managers. He was rather awed by the situation and aware of his position as a student. They treated him as an equal, a professional, and talked about the plant and what he would need to perform the task. It was the first time he was put in a situation like that.
C23: Oh, you naturally feel quite important, but I actually felt quite, felt good that my company had the confidence in me to send me into a situation like that. They obviously thought I could handle it.	This experience gave him confidence. He felt good that company had had the confidence to send him. His confidence rubbed off on him.
C24: It's the fact that for the first time you are being recognized by, by a group of senior people. I suppose that definitely make it feel important I'd probably never felt that before – I'd never actually made and impact on an organization before I had that day, or was going to.	What made him feel important was knowing he was getting recognition from senior people for the first time. He felt as if what he was doing made an impact on them and their organization.
C25: I tended to not want to say too much because er – you know, I do feel a bit intimidated maybe and I don't want to say the wrong thing. And I think that that was definitely something that affected me - I'd think a lot more about what I was going to say than I would otherwise.	He was very aware of his speech that day and cautious as he felt a bit intimidated and didn't want to say anything wrong. This caution and intimidation affected him that day – it made him think more carefully about what he was going to say.
C26: Sometimes you get hit by this unconfident feeling like you know, 'am I doing the right thing?' You know, that's natural I think. I realized that after a while.	He was occasionally aware of a sense of doubt and insecurity about his own ability, but accepted this as natural.
C27: But you have to keep believing in what you're doing is right and if you don't	By believing in himself and knowing that he could obtain help by phoning 'other

know, you have to phone elsewhere and get advice. And that was nice – I was always in contact with other guys via telephone or e-mail so could get their feedback.	guys' for advice if necessary, he coped comfortably.
C28: I'd actually like to know myself [where my confidence came from]. But I think er, it must have something to do with my upbringing, …	He's not sure where his confidence comes from – but feels it may have something to do with his upbringing
C29: I was, I was actually, I think I was more of an engineer, but I felt like a bit of both cause I had to, I thought to myself, 'well look, C, you are only a student, there is only so much they can expect from you', but at the same time I felt like an engineer because I was being treated like one. So, it was a bit of both, a bit more like an engineer.	He felt that he was both an engineer and a student. Knowing that he was a student provided some consolation to him, but because of the manner they treated him he was aware also of his role as an engineer. He probably felt he was more of an engineer than a student.
C30: There's a - I suppose it's almost a stigma attached to being a student because you haven't had that much experience and I think I wasn't fully qualified at the time. There were parts I still had to be trained on which I couldn't have any knowledge on – where I was going into, the type of project I was going into, ja.	He feels there's a stigma attached to being a student as he lacked experience and was not fully qualified. He felt there were parts of the project requirements that he had not been trained in, and which he could thus not yet have knowledge about.
C31: As an industrial engineer I suppose they, they expect you to know how to do time studies and how to do process charts and things like that. Those are all things that are expected of an engineer. As an industrial engineer you will need to have that human interaction as well.	He is aware that he will be expected to be familiar with certain standard engineering procedures. He believes that in an industrial setting interpersonal skills are also important.
C32: … I think I've learnt a lot more in life [about interacting with people] than I have in this course, I must say. We've done group work, but you maybe meet in class for two periods, maybe three times a semester at most, but it's never for long periods of time. I have learnt, but more in, more in the working environment. And that's where you really see how a group	He has learnt more in life about interacting with other people than on the course. He found the formal group work in the course is not appropriate for acquiring this expertise. Industry offers a better opportunity to learn about collaborating as it is far more authentic that group work in class.

works, I think, in practice.

C33: I suppose I liked, they (superiors) were very similar to me as well. We used to have our Monday morning chats about sport and things like that as well which I liked. You get the guys who really aren't interested in sport and you tend not to communicate with those people as much.

He bonded easily with his superiors because of their shared interest in sport. He found more difficult to communicate with those who did not share this common interest. A common social discourse facilitated his access to their professional discourse.

C34: I learnt here (to write a report). I know in Communication we were taught basically how to do it. We do… Oh, I,… It was quite a few – you could almost say years back now.

Although he knows he was taught to write a report in his first year, he is unable to remember it seems like years ago to him. This part of the course seems to have left only a vague impression on him.

C35: I can't remember which one (lecturer) we had at the time – but she did, after the orals, just speak to the class about 'maybe you should have done this, you should have done that' and remark. You as a person have to actually crit yourself, and crit the other projects for it to help. You know that, that does help a lot.

He can't remember his lecturer but that she did give feedback in the form of crits at the end of the presentation, and expect them to crit themselves and each other. Such teacher and peer feedback helped a lot.

C36: I also learnt naturally at work, but, at that time I was a Scout and I was actually troop leader at the time. At that stage they expect you to start training the boys and that's where you start learning to communicate for the first time, you are now in charge of a group of people. And that's where I started learning as well.

Although he learnt about presentations in industry, he feels the greatest contribution came form his involvement in Scouts. He was a troop leader and being in charge of others necessitated that he learn how to make presentations.

C37: I remember one of the first times I was showing a group how to do a couple of knots and things like that, and I kept on saying, uhm '. And the guy actually, my troop leader actually said, 'look, start cutting that out'. And I didn't realize I was doing it you know. That was one of the first times I started thinking about what I say in a presentation. Even though that was such a small informal thing, …

When he gave his first presentation the troop leader pointed out to him that he was saying uhm regularly and that he should 'cut it out'. He hadn't realized he was doing it. This was the first occasion he recalls thinking about what he was saying in a presentation. That made a great impression on him, even though it was an 'informal thing'.

C38: I must say I – maybe it's a bad thing – but I'm more aware of it [how I talk] in my work situation. When I'm with my friends I really couldn't care less. I can revert to a totally different lingo when I'm with friends.	He is very aware now of how he talks at work – he feels it may even be a bad thing. When he is with friends he 'reverts' to a totally different language and is free to express himself as he pleases.
C39: People at work expect you to say something within certain limits. You can't overstep something, say something. I suppose you tend to learn by getting dirty looks and people maybe ignoring you if you went over those.	He aware of expectations to conform and limits to what he can say to colleagues. He has learnt where the limits lie from his colleagues' disapproving responses. This is a very tacit process.
C40: And that does bother me at times as well, I must say. You know, it does bother me I've thought to myself, 'why do I have that almost split personality in a way'. So I think, you have to, you know.	Although his awareness of his two different contexts bothers him (he describes it as almost having a split personality) he thinks it is unavoidable.
C41: One thing I'm definitely aware of is, more of what people think about you at work. I think you have to because it's your profession; it's your bread and butter. And you are going to move up according to what your superiors think of you. And uh, you probably tend to, I would probably tend to put on a bit of a, an act, you know, not in a bad sort of way … just to be more accepted, I suppose.	He is very aware of what people think of him at work because his profession and financial status are at stake. He believes that as his advancement is dependent on what his superiors think of him, he needs to make a good impression – what he calls putting on an act to more acceptable. He qualifies this by saying that the purpose is not to deceive, but to conform or please.
C42: It's naturally that whole, that whole confidence scenario – you have to come across as very confident.	Part of making a good impression is confidence –he feels this is essential to being accepted as an engineer.
C43: That [knowledge] would be… but maybe something more important is ideas you know. Not everybody can generate good ideas and I think engineers need very good ideas, you know those people are recognized.	He believes having good ideas is more important than knowledge to an engineer. As not everybody has good ideas this is the characteristic likely to get recognition in an engineer.
C44: I suppose the average of us – we are happy to do things the way they are, and we will accept that, but there's always people who'll do a little extra - think up	The average engineer accepts convention – those who innovate stand out. He finds that students are more open minded as they have not appropriated the conventions

something new. I think students normally have a lot more ideas than people working. They tend to, just be more open minded.	fully. He values innovation, but feels that as students take on the conventions, their ability to innovate lessens.
C45: I think I've imitated a lot of people. I tend to look at people very closely and see what their good qualities are and I try to take those. It doesn't always work, but I do look at them. Especially successful people, I'll look at them and see what it is about them that makes it that way - gives them that confidence, gets that feedback from people.	He imitates many people as he observes them closely purposefully looking for their good qualities and appropriating those. Although this does not always work, he continues imitating- especially successful people whom he observes to gain social skills in a professional context rather than strictly technical expertise.
C46: I suppose for me [learning] was basically looking at the way things were done. I would go back to a situation, or I would a meeting or a presentation, and sort of crack that, you know and say, 'how could I have done that better? This is what I like, that isn't what I like'.	Learning to him essentially involved looking at the way things were done. He would reflect on events critical of how they had been done and 'crack' them, by considering how he would have done it better, and what he liked and didn't like.
C47: You, you also tend to learn things about the hierarchy of the organization as well, the politics, by the time I left, I still didn't understand all the politics that went on there when I came, you know nothing. Ja, and you learn where you can tread. It's almost trial and error.	He also gradually came to understand the 'politics' of the situation. When he arrived, he understood nothing of it – when he left, he still did not understand it all. This knowledge he acquired by 'trial and error'.
C48: Guys are very scared of being stepped on. And as industrial engineer, you are often responsible for changing their jobs you know and they are aware of that, and that's, that's why I think they get a bit defensive. Some, some of them are just like that, but it could be because of the power. And maybe they don't understand enough about what you are doing.	He believes it is necessary to understand the politics because of the nature of his professional tasks. He believes people may be defensive or uncooperative. This could be the result of the 'power' he has as an industrial engineer, or because people don't understand what he needs to do.
C49: I don't know if it [language] would play much of a role. For me personally it doesn't, doesn't really – I don't look into that much, I don't judge people by what they write, so I don't know if that would [matter] much. Ja, I suppose that's me as an engineer.	He doesn't believe that language plays a role in his learning because he personally doesn't judge people by their writing. He knows this is a personal value.

C50: Normally it could – if it's from engineer to engineer it doesn't really matter. If you go from engineer to accountant then maybe it's a little different. It depends on the flow, the flow of the, the writing.	In professional circumstances he feels that language does not really matter in the way one engineer writes to another, but it may in the way an engineer writes to another professional.
C51: I'm sure I learnt that while I was working at Aberdare, because you, you learn what those people think. You learn how the average factory worker thinks – which a lot of people don't realize- a lot of people go from a, a school to a learning institution, and then get dropped in a factory, and er, a lot of managers have no idea of how factory workers think.	As an engineer he draws on his work experience prior to studying. It enabled him to learn how the workers think. This is something he was not taught in the course and which he would not have learnt it had he gone straight from school to Technikon.
C52: They have other beliefs on things like capitalism and how it is evil. And I don't think managers have any idea that that's going on the factory floor. Whether it's important or not I don't know, but when you strike up a conversation then it is. You need to know what sort of level you are talking on.	He feels there is a big difference between the ways engineers and workers think. He believes this knowledge although not included in the curriculum, and thus not valued, is important in interpersonal interaction in a professional context.
C53: I won't use the type of language I'm using with you now, or let's say with fellow people. Sort of I would degrade my language. Do you understand what I'm say-ing? Especially the way the black people talk. They tend to drag out their words you know and they also like you to do that. You have to you know, you must say, 'over theerree' you know, then they understand.	He intuitively adjusts his manner of speaking in dealing with workers. He downgrades his usage when talking to black workers whom he does not regard as peers. The adjustment which seems to be at the level of enunciation is aimed at showing solidarity with them and facilitating understanding.
C54: Look - people definitely judge you by the way you speak. Uh, I mean, to go off the topic a little bit – could be like seeing a beautiful woman, and then she suddenly talks with this like really bad accent and just totally throws you off. Ja, I think it's similar to the way people who might judge you. If you're going to *talk to people with a lower education with a very high and mighty*	He believes people definitely judge someone by the way they speak. He believes his manner of speaking should be congruent with the image he wants to convey. He does not talk to workers with a 'high and mighty' accent as they may perceive this as an attempt to be superior. Similarly he won't speak to managers in an uneducated manner as that won't create a

accent, they tend to see you as somebody who almost wants to be superior to them or above them you know. And then again, when you talk to high level managers, you can't talk like an uneducated person as well, because, you won't give a very positive, message of yourself across.	positive impression of him.
C55: I think a language makes it a bit easier. It makes your life as an engineer easier if you can almost slot into those different levels.	Adjusting his language appropriately to the audience is a way of making his life easier as an engineer and a way of functioning at the various levels.
C56: Uhm, I was sitting in a class where there were three whites and the rest were all black, I think we almost knew a lot a lot more than they did and the lecturer tended to talk at their level which was very basic. You can understand why, but at the time you do tend to think, 'geez you know, I really know this – I've done matric English I got a B or C or what ever'	He found it frustrating being one of three white (L1 speaker) in the group. The class seemed to be pitched at a L2 level which he found repetitive and boring, although he could see the need for the others to do it.
C57: I realized the importance of it [writing course] when I had to - even this letter (pointing) of application. It has to be done in a certain format which we didn't do at school. We did how to write a letter and all the basic things – but this is something you learn in Communication.	He thinks nonetheless that the course was useful as he realized later on that he would be required to produce letters and documents that he had not been taught about at school.
C58: You don't want to appear stupid – how you write a report. So at least you have the basic background on how to do it. And I could always go and as one of the secretaries if I wasn't sure.	Being able to write a report properly would save him from appearing ignorant. The course gave him the basics. He would get further help from a secretary not an engineer.
C59: Ag, I wouldn't [take the same care in expression to a lecturer]-but at the same time I always keep in the back of my mind that these lecturers, I'm using them for references when I go for jobs, so. (R giggles) So you have to in a way but, at the same time it's back to the old story, where I'm, I'm more concerned that they know that I know what I'm talking about, Ja.	He would not take the same care in writing to a lecturer although he is aware that they will write references for him one day. What he focuses on I writing for lecturers is showing that he knows the work, because he believes this is what matters to the lecturers.

C60: I wasn't too sure about this (points) question I must say. I actually had to start waffling in the beginning a bit before I started getting my train of thought. I think that's why I came with this. If I knew my question – if I knew that answer properly I would probably maybe write it differently.	He admits to being unsure about how to answer a test question and thus beginning his answer with waffle until he got some direction. He feels that he would have answered differently had he actually understood the question and known the answer.
C61: I don't think the lecturers actually put enough, er, feedback on the assignment in it. It's more a question of just marking it and saying thank you very much. Assignments are just marked, and you're given the mark at the end. You don't know if he really read through it, or if he just glanced over it.	He feels there is insufficient feedback on assignments. He feels lecturers are unappreciative of the effort in writing, and he even doubts whether they really read or just glance over the assignments.
C62: Where I know some of them mark with a mark sheet and they show you where for introduction you got so much, for this section you got so much, conclusion you got so much and references etc. And then they may have some remarks and I like that type of, of marking an assignment because you do know where you, you went wrong.	He prefers getting a breakdown per section and remarks as this enables him work out where he went wrong. Focus seems to be on writing as a product: a text with various sections.
C63: when I was asked a question in Motor Vehicle Engineering. We were talking about brakes, and which is going to take more pressure? And I started rapping off about, well there's more force on this side, and there's torque coming from here and there's this coming from here. And then when I answered the question I actually thought, 'geez – where did I get all that from?' You know I would never've thought of that before and you start thinking in terms of force, and, and pressures and torques and things like that.	He amazed himself recently in Motor Vehicle Engineering when asked a question he 'started rapping off' using technical terms to answer. When he finished answering it he was amazed at his own answer - he had never thought like that before, but realized he was now using the discourse of MVE. (an action which involved using the words and thinking in the terms of MVE)
C64: I think that relates to, the subjects and what the lecturers speak about in class And they're talking on the board, and they explain this and that using different types of words that you've never thought of and, you're going to have to use a lot in your	He ascribes this development to the differences in the words lecturers use when explaining things. These are words that although he may not have thought of before, he knows he will himself have to use in assignments and in class.

assignments and when you speak in class.

C65: Uh, I think it happens when you learn, and you start writing them down in the test. When you start writing it down – they always say you learn better when you write it. Especially when you're learning you write notes, and uh you have to explain things. that's the way I'm always studying you know, I believe it works for me.	He started appropriating terms when he studied for tests and used them in tests. He believes that by using the words in writing he learns them. He's been told that he'll learn better if he writes, and he agrees.
C66: I was actually warned by the factory manager that - this department is very political you know. Be careful – don't poke your nose around too much. There was one woman there that was very friendly, and I got chatting - one of the black mamas that worked there and I got chatting - and I joked with her a bit, and I went and sat with them during tea-time and, then the sort of rumours started flying around that this was my girlfriend, etc. And there were a lot of black ladies who worked there and they thought it very funny and everything. By the time I went to that department, I tended to get quite a good feedback from everybody, cause they all tended to know me and it sort of eased all the tensions that possibly may have been there you know. And that that was just something small which I think did help me.	He had been warned that where he would work was highly politicised When he got there he found that one of the black women there was very friendly and he started chatting with her. He also joined her group at tea-time and this started playful rumours that she was his 'girlfriend', much to the amusement of other workers. By the time he started working in that department, he knew them and they co-operated with him. His bantering with the workers was something that helped him avoid the anticipated tension in the politicised environment

Lindiwe

L1: One thing that I learnt about thinking is whenever you think now as an engineer, you are not thinking about yourself, you are thinking about other people. Whatever decision you make, you must know that it will not most affect you, it will affect other people as our job is based on studying what other people do, are doing.	She has become aware that when thinking as an engineer, the interests of others – the workers - take priority above her own interests. This implies the performance of professional tasks: studying what people are doing and making an appropriately motivated decision.
L2: We were told how do people react to industrial engineers, so that's when I got the information how to think hard and independently.	She became aware when she 'got the information'. This realisation that she would have to be responsible and independent in her thinking as an engineer occurred when they were told how people react to industrial engineers.
L3: So, it started in S2 where in Work Study II you are given a project, that you have to do. So you go out to the company, it was a group, so we have to identify and come back with solutions that we think will be effective.	Doing a group project in industry that required identifying and resolving a real problem further enforced her awareness about how an engineer needs to think.
L4: The way they react to industrial engineers because we are not accepted by some of the employees so you have, you had to know how to deal with people. Because we have so say if something is wrong, we have to say, ' this is wrong'. Take it down to the manager, so you know that people they will view you as an informer. Ja, so you had to be very – try to make them understand, what you are doing, what is it all about to be an industrial engineer.	As industrial engineers they are not accepted by all workers because they may need to make unpopular professional judgements – she may have to say that some action of the workers is wrong. Workers don't truly understand what her responsibility is. Because she needs to observe them and make recommendations about improving their productivity she sometimes feel they wrongfully view her as an informer.
L5: To tell you – it's [making the workers understand her role] very difficult. Especially in my case, I was working in. Almost everybody there was a man and they were very old (L giggles) so, people didn't understand. It was very difficult – it was very, very difficult.	She finds it 'very difficult', particularly as a young woman working with older men, to make the workers understand her job. Their social and cultural expectations make it awkward for her to function as an engineer.

L6: That's why I think it was one of the things that I used to deal with people as I, as they were black and I'm black, so I knew how to deal with older people. First thing is to respect them – that's the first thing that you can use so that you can gain everything.	She draws on her common cultural background with the workers (understanding the importance of respect in dealing with people). She feels she can use this understanding of respect in her culture to 'gain everything', that is, perform her professional tasks.
L7: I know that in order to gain information as we have sometimes to go to them and ask, 'what do you think is the problem? What do you think would be the solution?' So, you have to have respect in order to gain their trust and you also have to show them, you have to make them trust you, so that they can give information so that's one of the things – trying to deal with people, you have to be very respectful to them in order that they can help you.	To perform her tasks she needed their co-operation in obtaining information. By respecting them she gained their trust and this facilitated her interaction with them. She drew on her cultural discourse to perform as a professional.
L8: Education doesn't have to make you lose respect. When, when you have education, you have to have respect. I was dealing with old people, so I didn't have that thing I was educated, they were not educated. So, I just said, 'they are old, they are like my parents' so I have to respect them. *So, they respected me there, I know, that's why I get the information.*	Her awareness of the need to respect older people in her culture, is more important to her than her professional education. She regards the difference between herself and the workers in terms of age (cultural category) and not education (professional category). She ascribes the success of her professional dealings (getting the information) to her interpersonal skills and sincere respect for the workers.
L9: It helped me a lot – especially women, they would be interested, 'what thing are you doing, my child?' And then I would tell them what I'm doing and show them that I'm respectful to them. They are just like my parents. Talk to them.	She related well to the women who regarded her with the same interest as they do their own children. She sees her interaction with them in both social cultural terms and professional terms.
L10: Sometimes I did feel like a child, when I saw that I was the youngest so I felt, 'No, I'm a child'. And when I think about my age, I say, ' I'm a child, but look where I am, look where I am. I'm working'. *I'm not old, but I knew what I was there – I had to be responsible so that they can show me respect.*	Although she was aware of her youth, she did not regard herself as a child, but was in fact very aware of her professional task and responsibility. Being responsible was a way of earning their respect despite her youth. There is a sense of duality – socially she is a child, but professionally she is not a child.

L11: I'm very aware of my responsibility I don't take myself as a child when I'm at work. When I'm at work that's when I say, 'no, I'm not a child I am an industrial engineer'. So I have to be responsible. I have to show my responsibility as I was given tasks, that is to identify the problems, come up with solutions, so those were my responsibilities.	At work she feels like an industrial engineer, not a child. She feels the burden of professional responsibility. She performs her professional responsibility by identifying and resolving problems.
L12: When my last time came I was given a file - it had my name on it, my surname, it also had their logo. That was their way of saying thank you. They valued my work they valued what I was doing so that in other words I was respected, even my manager gave it to me.	On her last day her manager gave her a gift of a corporate zip folder with the company logo and her name on the front. She took that as an indication of their regard for her: she felt respected, appreciated and valued as a professional.
L13: And also the people, they showed respect to me. Every time that - I worked in three different areas: East London, Butterworth and Umtata, so, the first time I went to East London, they phoned me and said, 'where are you?' (L laughs). Ja, it was very nice! 'Why didn't you tell us you were leaving?' so I saw that my being there made them respect me.	The people in the various areas where she worked enquired after her when she moved on to the next region. She felt respected as it was 'very nice' to know that they noticed her departure. The way people reacted to her made valued and respected as a professional.
L14: (laughs) Uhm…. When I'm here at school … specially when I'm in class, I feel like a student. Ja, but when I am at work, that's when I felt like an engineer, because I was doing there what I was supposed to do.	She is aware of a dual identity – as student when on campus, and as industrial engineer at work, because at work she does 'what she is supposed to do'.
L15: (L sighs) It's a very difficult question, but what I can say to be an industrial engineer, when I view myself as an industrial engineer I view myself as a, as somebody who can make a difference in the company. Somebody who can improve the working, the performance and the productivity of the company and it is required of you.	Although she finds it very difficult to define what being an industrial engineer means, she feels that for her it means making a difference by improving the work performance and productivity of a company. She has appropriated a central value of the profession.

L16: (laughs) Learning from out of a book is very different from practical because when you are doing practical you, you see it's something that is real. You experience it. You feel it. You know how it is, unlike when you are reading in a book.	She admits knowingly that to her there is a big difference in learning from a book and learning in a practical situation in industry. In practice, her learning is 'real' – something that she experiences and feels, something that she has to deal with. This is unlike reading from a book.
L17: Sometimes when you read a book, you think I want to get 80% out of this subject, but when you are there you know that this is the real situation, this is the real thing. I have to deal with it – unlike when you are reading from a book. Maybe it's like somebody – when you are reading from a book like it's somebody's experience, so it's not your own. So when you are doing practical, it's your own so it's very different.	Reading feels like somebody else's experience to her. When she reads a book she wants to get 80% but when she learns in practice she wants to 'deal with it' because it is real. She seems to indicate that is it possible to get 80% without 'dealing with it' in a real sense. Books are approached in a strategic manner and provide her with knowledge to score 80%, but her experience gives her understanding.
L18: It's one of the things where I saw how difficult it is to be an engineer. I know that most of them, they liked me, but what they were doing, I know it was wrong because most of them were coming drunk to work - their performance was…wrong, to the company, and also to themselves. It was a safety hazard. So I had to put my profession that I study first before thinking about being, about thinking of them liking me. I had to be strong that day. I had to identify a problem. No matter it was going to cost them their jobs at the end of the day, but I had to stand up and say, 'this is wrong; this is what I'm here for. So, it's one thing that. It was very, very, difficult.	Although she found it very difficult because she knew the people, she was able to say that their behaviour was 'wrong' to the company and themselves when they came to work drunk. She put professional considerations before social or personal considerations. She was willing to face the personal and moral consequences of her decision. It took great strength that day to say 'this is wrong'. She accepted her professional responsibility although she experienced it as 'a very difficult time'.
L19: It was also their [word] supervisor - the people who were responsible, Ja, they said it's not the 'supervisors', it's 'technical service officials' (laughter). I thought since they were supervisors, they were supervisors and so I could use the word supervisor. They said, 'no, the technical term is technical service', so I have to be very specific.	She used ordinary words in writing her report but was asked to change it to the correct technical designation. She thought she could use the word 'supervisors' since 'they were supervisors', but she discovered that she needed to use the formal designation. She discovered that ordinary ways of knowing and naming things were not acceptable.

L20: I based it on what I saw and what I looked at the managers' point of view – how do they view the problem, and also, how do the employees view it. So I used the managers, the employees and the direct observation, and what I think about the problem. Myself, like how do I think is the problem. What is the real cause – most of it was the - about the causes, what is the real cause of the problem. Maybe the managers will say it's the employees. The employees will say we are few – the managers don't want to employ more. So, I had to go there and observe and at the end of the day say, 'this is the real cause of the problem'.	Her findings and recommendations were based on what she saw – by looking from the managers' and employees' points of view. She made a judgement based on professional procedures and values. She is aware of herself as a professional in making that judgement, not constrained by social or cultural ties, and declared 'this is the real cause of the problem'. She displays confidence in her thinking as an engineer.
L21: There's a difference [between the industry and Technikon reports]. Because when you're writing, you have to say, these are the methods that I used, because that's what they want to know: which methods did you use to identify the problems? Which methods, which Work Study techniques did you use to identify them. So that's what the different report requires. Although the company wants to know what are the problems, not what are.	She is aware of the difference between the values that hold in industry and Technikon, and how the reports to each must differ accordingly. The Technikon needs to see her familiarity with methods and techniques (academic procedure) while industry is interested in finding (and solving) the problems.
L22: (Laughs) There is a guideline in the logbook. Like the structure of the report. And also the logbook guides you what is required from you - like what is required from you, your report. So that's where I learnt how to write. You read the logbook first, the logbook tells you what the report must be and what is required.	Her knowledge of how to write a report comes from the logbook. It is 'where I learnt how to write'. (She uses anthropomorphism, it "tells" her about the structure, but there is no consultation or interaction with lecturer.) She follows conventions carefully because she knows this is required, but there is sense in which it remains external.
L23: There is a BIG difference in the environment because here at school I'm dealing with other students, black and white and also with the lecturers, who have experience, so they tell us, 'this is our experience','while I was working …'. So here we learn from the lecturers.	She feels that there is a big difference between learning in industry and at the Technikon. The experiences of others are the source of learning in class. Their anecdotes make an impression on her, and she figures out from their stories how to work with people.

L24: So, that's one of the experiences that they shared with us how it's like to work. Ja, it helps you – likely a lot, because you know what to expect. Sometimes that things will not be as … you think they will.	She feels that it is helpful when the lecturers 'share how it's like to work' because she then knows what to expect. She learns from their accounts that things don't always work as expected.
L25: Ja, (laughs) it did! Especially when I was going for my training I didn't know what to expect. So, it's one of those things where you don't know what to expect. When you are going to the industry, you don't know what to expect. Sometimes you feel lost, ja, you become so alone.	She is self-consciously amused by her experience in industry. She didn't know what to expect. Although she realised it would be different to the Technikon, she didn't know how it would differ, but accepted that. She is able to tolerate – even expects – this sense of not knowing, of feeling lost.
L26: Uh, being myself, uh, I think of myself as a woman and an engineer. And a very independent one! (laughs.)	She defines herself as being a woman and engineer – ' a very independent one', a thought which makes her pleased.
L27: When I look at my career, I'll be, I'm looking at myself as somebody who is very successful, very lucky because some people didn't get this far. So, that's what being myself means. I know what I, who I am, I know where I come from, I know what it means to be here to me, so I know to be here it makes my parents proud. It makes me proud – I have something I can look forward to. So, that's one of the things, when I talk about being myself. Because I know other people, I have, know I have the responsibilities; whatever I do I have to be responsible.	She feels successful, but also lucky to have got this far. She is aware of who she is, where she comes from and 'what it means to be here'. She is proud of herself and looks forward to her future. She feels her responsibility to herself and others all the time.
L28: (sighs) No, – they [being a woman and an engineer] don't! [sit comfortably]. Because many people when they think about engineers they think about men, so (L laughs) when they see a woman as an engineer, it's something that they don't want to deal with - especially men. It becomes very difficult, so when they see a black as an engineer it's something that is very 'out' for them. You can't be an engineer, you can't be educated more than I am, as most of their cases.	The tension (dissonance) she feels between being a woman and being an engineer is the result of others' expectations. She finds it amusing that men have difficulty in dealing with her as an engineer, particularly also because she is black, she feels they see her as 'out', or unusual. Black men especially believe that a woman should not be more educated than they (men) are.

L29: As I have said, when you are doing practical, you have to write what have you done to make people understand you. So, when you write something, sometimes it's hard to express all what you've seen: it's hard to say, 'I've seen this. I've done this'. But when you are writing, it's very easy for somebody to take a paper and read. So writing it helped me. So, since I've written it, I understand now - I saw, what you asked us and I know what I answered.

She has to write to explain to others what she is doing. She finds expressing what she has seen and knows in writing difficult, but feels it's easier for the reader to read.

Writing helps her understand. It is what enables her to transform what she saw and did into what she knows. What she answered (composed in writing) she knows.

L30: It's very different. Sometimes speaking is easier than writing because when you speak, people have chance to ask 'what do you mean?' So, speaking makes things more clear than writing. Ja, I think when you speak, that's when you understand – get the clear understanding. So writing, although it is helpful, but it doesn't really explain what do you mean. So, speaking explains everything. It explains the writing.

She prefers speaking to writing as it allows her the opportunity to adjust her message if it is unclear to her listener. It leads to greater understanding. Although writing is helpful it 'doesn't really explain what do you mean'. She feels speaking 'explains the writing' because it is interactive. Writing is fully her responsibility and she thus feels it is less adequate for making the other person understand.

L31: No, it's not! (easy). (Laughs) It's very not, because when you are writing the reports, you have to make sure you are using the – I would say, the Work Study learnt, you have to use the procedures, the techniques that we learnt in Work Study.

She is adamant that writing is not easy as it requires that she is text responsible and demonstrates her awareness of the procedures and discourse of the profession. She is aware of epistemological issues.

L32: So most of the time we use book that we used in S1, so that's what, what Mr M and Mr vd M told us – that we must never sell that book, because every time you have to write a report, sometimes you have to make an "implementations," you have to know how was it done how did, what were the methods that I used. (Giggles) I use it! Most of the subjects I would say are linked, ja, so you have to.

When she doesn't remember these, she refers back to her first year textbook. They were advised not to dispose of it as they would need to refer back to it when they described methods and procedures in their reports. By keeping the book she keeps access to the knowledge. She seems a bit sheepish about using it, but feels she has to, because she believes all the subjects are linked.

L33: Although we did the report writing in Communications I, ja - the way that, their format is the same. Like you start with a summary – everything, so the format is the same. But when they specify this is the way we want it, so, that's where you use that specific version. I think that's why they teach it in S1, so that you can get that difference, so that we can know that things will be different from school.	She recalls 'doing' report writing in Communication I, and says the 'their' format is the same (she differentiates between CCM and others subjects). CCM was useful to her in terms of format and highlighting differences with school writing.
L34: Uhm, when I'm talking about my thinking, that's when I was looking at the problems. More, the way I need to express the problem, so that they can be understood as problems although you saw it, but you had to write it in a way that even the one who was reading – the managers – even him, they could see that this is a problem So when you express your problem, you think about how am I going to express it, so they can all see, 'oh, this is really a problem'. So, when I'm thinking about trying to convince people to see the way I see, I have to try and make sure that when I express it, it was seen as a problem – as the way I saw it – as a problem.	Her thinking now refers to the way she looks at problems – specifically how she is able to express problems as problems to others, like the managers. She considers carefully how to express her thoughts about the problem in writing clearly enough to convince others also to see it as a problem, for it is in writing that she must show that she recognises the problem in her thinking. She regards writing as part of her engineering.
L35: No, nobody taught me it's just the way it is. When I – to know that it is a problem, you look at the effect that it has to the productivity.	She has internalised productivity as a professional attitude and this enables her to identify the problem. She's not aware of being 'taught', 'it's just the way it is'.
L36: I say I used my first studies – time studies – and work measurement techniques. So, I specified what I used to collect the data so, so that it can be accepted at the Technikon. So they can see I was doing my industrial engineering job not just any job. You have to put it in. What methods you used – they want that. That's specifically what they want - you have to specify what is it that you used or, it's one of the things that make it different.	In drafting her report she used time-study measurements, and specified how she obtained the data to make it acceptable. This would establish that she was in fact, 'doing her industrial engineering job, not just any job.' She is aware that she needs to follow specific procedures to obtain approval. Describing method is valued in the discourse and what makes it different, so she specifies it.

L37: (laughing) Ja, you can write it [differently], but there is only one method. You have to use all the Work Study techniques that we did. So, that's the only way they can, they can relate it to industrial engineering. Ja, so without them they would – sometimes they don't accept it if you don't have time studies and others.	She laughs at her own compliance with this rigid requirement in terms of method. Although she could write her report differently, she would not deviate from established methods as that is the only way the lecturers can 'relate it to industrial engineering'. If she were not to follow the conventional methods, her work could be rejected.
L38: [The problem] It is the MOST important one because that's where - even the company can see what have you done for them.	She knows that industry on the other hand judges the worth of her work in terms of the problem she solved.
L39: In the first year as I said I knew nothing, even about collecting information. So, that's when I was helped – when we are doing the project for S2, that's where it's also part of the experience that you gain. Because you GO to the company as a group.	The group work productivity project in Work Study II helped her move from knowing nothing in first year to where she is now. She gained from going to a company, and doing a project.
L40: So when you're doing training, it's almost the same thing, but it's just that you are alone now. It really does [make a difference]. (Laughs) Because you don't have somebody to say, ' no, don't do it like this, do it like this!' You know that everything it's your responsibility. Writing the report, finding the information, it's yours. All alone. So, nobody else. It's very difficult writing it alone – knowing there's a risk.	Her experiential learning semester differed as she was no longer in a group, but alone without support from peers. She now laughs at the anxiety she felt at being alone. She was aware of the risk and responsibility in finding information and writing the report.
L41: I used the textbook that we used in Work Study I. Ja, I went back to Work Study I to see what must I specify when I'm talking about the problems, what must I specify. Really. So I used that – the logbook – and then the textbook to make sure whatever I was doing, it was something I had learnt, not something that I think, but, something that I'd learnt, so, I made sure that it was right thing.	She referred to her logbook and Work Study textbook to make sure that what she was doing would comply, i.e. something that she had learnt, not something she thought up. She felt reassured by following prescribed procedures. To ensure that what she did was right; she did things as she had learnt, as opposed to intuitively, or as she thought.

L42: [Writing for lecturers] It's very different. But when it comes to lecturers I know there are not any favours. No sympathy at all. So you have to write well. Starting from the assignments – like, because they always give us the assignments, 'do this' and 'do that'. So, I try all the time to be specific.	She feels that because the lecturers are critical, – they show 'no favours, no sympathy' - she has to write well. They expect that her writing will meet the task requirements. She is aware of being specific all the time to meet her lecturers' expectations.
L43: Uh, (searches in text) I'll start [choosing specific words] with the work-working conditions and work environment. I, maybe I was doing the mechanical report – I wouldn't look at the work environment. I'd look at the machines, also the, what I did to fix the machines. So you look at the working conditions and the work environment as it affects the employees, before you can say these are good improvements.	Choosing words appropriate to content focus is one way of being specific. Knowing what topic to write about (work environment as opposed to machines) is part of being appropriate. She has to understand the issues to be able to make a professional judgement. Knowledge of what is appropriate enables her to make a professional judgement.
L44: There's no special way of writing the sentences, but you mustn't, they mustn't be long. You must try and make sure that you don't have to write two sentences explaining one thing.	As far as the actual writing is concerned, she says only that sentences must be concise and to the point.
L45: So, the most thing they rely on is the way you present it. Although they've approved [of the report] as I said, the passing or the failing depends on the presentation. They don't give you marks about having it, no, when you present it, that's when they give you marks.	She feels that the live presentation of the report, rather than the written text is what determines the grade. The report is not marked independently; a mark is given immediately after the live presentation.
L46: Maybe they won't have the chance to go through the report, so that's where you must be specific, so, writing a long thing won't help. Especially when it comes to the lecturers, because they don't read it, all of them.	She believes that because the report is long, and to be followed by a live presentation, some lecturers may not read the full report.
L47: In the logbook they tell you [what to emphasize in the report. But even when you go – because you have to make an appointment –Mr vd M tells you, 'no, when	She asks for interim comments on what to emphasise in her presentation from her lecturer. However, the 'telling' of what to do in the report, is in the logbook. It tells

you do the presenting we are not interested in all that. What we are interested in are the findings and the recommendations.'	her how and what to write – the lecturer tells her what to emphasise in the presentation.
L48: You stand there as a student – and from practical training. That's what they want to learn: what have you learnt? Is the theory we gave you, helps you? So you stand there as a student – who's been to Eskom, who knows what's going on to Eskom. So, they are the lecturers and you are nothing. They want you to tell them what is going on.	She is aware of her dual identity (student and engineer) when she makes the presentation. It is a contrived situation: although she knows Eskom, she is 'nothing' when she presents because they are lecturers. They are evaluating her. She knows that she needs to display what she has learnt. She refers to theory as something 'they gave her'.
L49: What, what you must do, is to put, present the problems. The way you solve them, the way they were – the problems – the way you find them, you must be very sure that they are – the problems, they are the causes of the problems and also the recommendations – are they going to have any affect? Is the company going to benefit from your recommendations that you made? So when you do that, that's when they are say, 'oh, now she understands'. Ja, (laughs) that's when they make that conclusion. You understand what does to be an industrial engineer mean.	She knows the evaluation is about demonstrating her commitment to, and skill in the central value of industrial engineering: solving problems to benefit the company. She laughs because she knows the situation is contrived. What she has to do is to convince them that she is competent. At the moment that she convinces them that she understands, they conclude that she does understand what industrial engineering is about.
L50: I have one friend, N, she always, she knows herself; she doesn't have the ability that I have. She knows I can get the highest mark. So every time she says, 'you can do it'. So she always encourages me. Sometimes we do study together – some things that I don't understand I ask from her.	She describes the encouragement she gets from her friend, N, who even though she is weaker and less able, is a great source of encouragement. They sometimes study together and she'll ask N things that she doesn't understand.
L51: I ask her to read my report - and she read it. And she said, 'this is good. You can do it'. No, she didn't suggest any changes, she just read it and said, 'oh, this is very good' so I know there won't be a problem – even with the presentation.	She asked N to read her report before she submitted it. N made no suggestions or comments of a substantive or critical nature, but offered affective support which convinced L that her report and presentation would not be a problem.

L52: Yes, you give it to the mentor and he makes some comments. Not any (changes). He may suggest some technical terms that you must use, but not about the body itself.

Her mentor read and commented on her report before she presented it. He didn't comment on how it was written except to point out some 'technical terms'.

L53: Since '94 to '97, I was in a debating society, so (laughs) I did very well. It helped me very much because my teacher there taught us how to present – the people, eye contact, everything. You must look at them, so that's why I don't have a problem with the presentation because I was taught at school, by my teacher. Ja, before, before I came here I felt that I can do it.

Her ability to present well is something she brought with her from school. She feels that her four years experience in debating at school helped significantly with presentation skills. Her teacher had taught her explicitly how to present, and it thus posed no problem when she had to do it at the Technikon. She was also used to presenting to a large group of people.

Andiswa

A1: When we were studying something our lecturers are always explaining about these things and, I don't know how it happened, but I know it did happen. So I'm always thinking about technical things, about improving things. But when I was in S1 I didn't understand anything, but as the time went on, it's then that I began thinking about technical things.	Although she is aware in a change in herself, she's not aware of how it happened. Although she can recall her lecturers explaining things, she does not ascribe the change to that. It is something that happened gradually. She feels she knew nothing when she first arrived.
A2: If I see something outside not necessarily class, I always think about if that was designe by me I wouldn't have done it this way, I wou have done this and this. Our kitchen cupboar are designed in a very low-, you always hurt your feet. If that was me I wouldn't have designed that cupboard to be there, maybe it would have been up to (gestures).	She is aware in her daily life of design and considers how she could improve the design of things. She has thought how she would improve the designing of her uncomfortably low kitchen units.
A3: When I came here I didn't know anything. So, when I, when I did Pre-Tech they told us all the basic things about drawing and then when we came to the mainstream we were like better now, we knew the basics, we knew where to start.	She feels that when she started she didn't know anything and thus did the Pre-tech course. Here she was told the basics and so made better. She believes she had to be improved before she could start.
A4: Uhm, I didn't know how to write a report. So, I saw some students' reports, so I learnt from other students cause I had never written a report before. So I saw this beautiful pictures the way they were writing, and - I didn't know even how to use a computer.	She was overwhelmed and impressed by other students' well presented reports (she was not even able to use a computer). She looked at other students' reports to learn how to write a report.
A5: They have taught us, but no one has told us actually what you need, or what is actually needed in the conclusion. I, you know the format, that is the cover page the index, the text, introduction, but you don't know what is actually – what is needed.	The teaching did not meet her needs – although she can list the parts of a report, she does not know how to write each part. She does not know what is 'actually needed' – how to do it.
A6: I think I leant more from the other students because, they didn't teach us about all the – we must produce cover pages and	She is convinced that she learnt more from looking at other students' reports than from the teaching as the lecturer did not make

the pictures and make your report very interesting. So I think I leant that from other students. Yes, because if I didn't look at other students' reports and I was taught, just taught to write a report, I know I would have, have made something totally different from what the other students had written. I think I would just have written it one page and wrote my notes – I don't think I would even have typed it, because I didn't type.	explicit the parts that were unknown to her. Had she relied only on what she had been formally taught, her report would have been 'totally different'. She would just have copied a page of notes from a source, and also not typed it.
A7: I, like I saw from other students the way they were writing their reports and I asked them how to, how they do their … and then I had, I am still imitating what, what they taught, what, what I learnt from the students. That is how I did my reports.	She observed and explicitly asked other students about their reports. She still imitates what they taught her. She ascribes her learning to help obtained from other students.
A8: Ja, it's good because now I'm getting better marks than what I would get if I would use my own (method) of writing a report which I didn't have previously.	She is happy with their help and is satisfied with her improved marks. She feels she has got – obtained - something from them she did not previously have.
A9: Uhm, there's nothing much more than – like most of the time, what the lecturers think we are doing, or we are getting, is not what they think. Just because – they, even if you can you can have marks, but you actually find out that you don't know what actually was happening. Just memorize [to get the marks]. You just memorized.	She feels there's a big difference between what the lecturers think students know (as reflected in the mark) and what students actually know. Memorization enabled her to obtain a good mark without 'actually' knowing.
A10: Er, no not as a, not maybe like as an engineer, maybe for that course. Ja, that particular subject, or that course, but others they are just straight forward, you can like understand what is being said.	She feels that she has maybe not learnt to think like an engineer, but rather thinks within a course/subject. Some subjects are more straight forward and easily understood.
A11: You know, what she did is, we presented something and she recorded us on video camera. We would see ourselves there. And she would say what you did is this and this, and then you would have to improve on that. I, I was very nervous!	She learnt to do oral presentation with a video recording played back and critted by the lecturer. She had to see her own presentation then try to improve on it. This made her very nervous.

A12: I think I'm more used to the students and the atmosphere is free, so I understand the students so I'm not so nervous anymore.	She is more familiar and therefore more comfortable now. She feels the atmosphere is free.
A13: Basically modeling, it helped me to, self confidence. Because you have to go up to the ramp, and there's all those people - so you have to be confident.	She gained her self-confidence from her ramp modeling work where she has to appear before many people.
A14: If you write it exactly as it is in the textbook you'll never understand what they are talking about so you, you have to understand it and, and get it inside you and think about it and then you can write it in your own words - make sure you can understand it, not study exactly every word that you see in the textbook.	She makes a distinction between writing (copying) and understanding. Only once she has thought about it and internalised it, can she understand it and write it herself. This obviates the need to copy or repeat the words in the book. .
A15: I was reading my textbook, like, reading, reading, reading. And I was not like, I was not studying, I was not learning it, I was reading so that I can pass the test if I was reading it. Yes – I passed, but I didn't understand anything. Now I'm understanding what I'm studying	Previously she just 'read' the textbook repeatedly. Although she knew she didn't really understand, she could pass the test. She was unable to transform knowledge – only able to tell knowledge. She feels she now can understand.
A16: At school I was doing the same thing, or, maybe I would take the notes - the teachers wrote us lots – I would take the notes and do the same thing. Repeat repeat, then it gets in my head and I write the test.	At school she had also just memorized to pass a test. There was no sense of understanding – merely moving the information from the teacher's notes into her head.
A17: Yes, there is a problem, because now I am preparing myself for employment, for my work. So I have to understand everything.	She knows this strategy is problematic for her, as she now has to understand everything in preparation for employment.
A18: I think to me I understand more when I, I am writing it down, with my own writing, I think I am understanding it more.	She feels that by writing it in her own words she can get to understand something.
A19: Uhm, they gave us a part of the company, the plant, how they, they colour their cables according to what the customer wants and how they produce that. So, we had to improve on what they were doing wrong. How are they - that is the workers –	Her experience in industry gave her the opportunity to observe workers in terms of issues covered in the curriculum. She saw her task as improving what the workers 'were doing wrong'.

practising safety

A20: As the company, do we think they have… the workers, are there any need for this number employees that they have? And then we have to look at waste, and also the bottlenecks. So, we had to improve on those thing.	The students identified with the company, 'as the company we', and refer to the workers as 'they'. The values that she is committed to are those of her profession.
A21: I think the workers they are just doing their job, what they are told that you have to… that you two, you should do this and this, and you should do this and this.	She felt the workers did not share her commitment to improvement. They just do the tasks assigned to them.
A22: No. We don't think like the workers, it's because the workers just want to keep their jobs and that's it.	As a student, and engineer, she thinks differently to the workers who think only of their own jobs, not in terms of improved productivity.
A23: Uh, erm, well like at Aberdare they didn't see a problem with sitting down and drinking coffee, and chatting and coming to chat with us, asking us if we want to drink coffee. They didn't see a problem with that, but, WE as industrial engineering students, because we want to improve the company so that- this is a waste of time.	Although the workers were friendly to them, the students judged their very act of friendship (socializing) to be a waste of time – and in conflict with their professional values. She expresses solidarity with the other students, who are aware of their identity as industrial engineers, and experience the waste of time as a problem.
A24: What we did – we had to time the workers, uhm, who is quicker than the other. And if someone is doing this machine it will be better for her to go to that because she is slow, and the faster one will come to that one.	She observed, and did a time study to establish the optimal placing of workers. Her conception of 'better' in terms of speed and increased production, not worker preference, indicates that she has appropriated the values of her profession.
A25: (laughs) Um I think [my ability to make observations] it's the understanding of what exactly industrial engineering is all about. Because we know we have to produce, we have to improve, we have to re-design things to increase their productivity.	Her ability to observe people professionally developed because of her commitment to what she regards as the central value of industrial engineering: improving and re-designing things to increase productivity. It enables her to act (behave) appropriately.
A26: Uhm, it [being encouraged by a lecturer to write her own ideas] help, uhm, it helps us, to think about, to think ourselves,	Being encouraged to express her own ideas helps her think for herself and go beyond what theory was covered in class.

not, not to stick on what, what we are taught in class. To think about, to think for ourselves about, about the theory we have studied.	
A27: You have to understand about other people's ideas, other engineers' ideas, so you have to understand them. For example, if there were, if uhm, there is a new car that's coming in, they are always asking us even, do we know about that? So, we have to always be aware of what is happening to other companies.	She feels the need to understand other engineers' ideas. She has noticed that the lecturers encourage this by expecting the students to stay up to date on what is happening in local industry.
A28: Mr vdM, when he's explaining something, he wants us to talk. Like you have to, to say what you are thinking, what you as students are thinking about this and that.	She finds Mr vdM's approach of explaining by asking students for their views novel but useful.
A29: Well, … when, when I actually get, what, when I actually say it, what I'm thinking it feels better if he'd, like if he's approving of what I'm saying. *It does influence [my learning] – because you want to do more you want to, to get, to be a successful engineer.*	Although she has views on the topics she was shy to voice them. Once she managed to do it - and obtained his approval - she felt good. This also has a motivating affect.
A30: Well, actually he doesn't really say 'this is not correct', he just says, 'well, according to your view, this is what you are saying. But according to my…' – that is his view - and then explain, and other students will also say their views.	He does not overtly correct students' views, even if his view differs. Students are encouraged to express their views. He differs from them without being dismissive. She feels he values their views.
A31: Uh, in the first year I was like scared (giggles) I was scared…but now, I feel I'm getting there. I – I always sat at the front there, mm, kept quiet – didn't say anything. Now it's better that now.	She is embarrassed to admit that during her first year she was scared in class. She was very passive – just sat in the front and kept quiet.
A32: I think uhm, my self confidence has improved some how. (giggles) Uhm, because now that I can I can talk, I can express my views.	Although she can't pin point it, 'some how' her confidence has since improved, and she is able to express her views in class.

A33: Because I can't, I can't be a good industrial engineering if I don't express my views if I don't share ideas with other people so, I wouldn't be, I can't be good. I have to share my ideas with other industrial engineers.	She knows that this development of her ability to share her ideas with others is essential if she is to become an industrial engineer.
A34: We are always given assignments to do as a group. So, we had to express our views and we had to - each person had to come up with his idea how he, would he or she produce, or she redesign this. So, we explained to each other about our ideas then came up with that idea of…	Having to work in groups where ideas are pooled and discussed to come up with the best solution forced her to participate.
A35: So it's better – you learn more if you are working with guys than working with girls because we just, we just caught up with this thing here at the Technikon. We don't have basics of the technical things from home. Mm, you learn from them. Guys, I, guys are always, they were always, even when they were young, always exposed to everything that is technical. So, they know the basic things about technical things.	As a woman she feels she can learn from the men. When doing collaborative work she prefers working with men in her group because they are more familiar with technical things. She feels that because women don't have the same technical exposure in their home backgrounds, they have a backlog. Women students are confronted with technical things for the first time at the Technikon.
A36: Ja, like drawing. We always learnt - the guys they always know about the drawings. For example, when we are hand drawing, we are not supposed to use rulers or those things. They always have a technical thing how to, to … (demonstrating) You must, your pen must be here at, you must let you hand be free, that would be a straight line. We don't know those things! The guys know that! They told us that.	She describes how the men knew 'things' – had privileged access to expertise that the women did not. She ascribes this to the different background experiences of the men. Although the men shared their knowledge of things that were taken for granted but which the women didn't know, she feels a bit indignant about her ignorance.
A37: No, uh-uh, he just told us that, you must draw with our own, with free hand.	The lecturer didn't tell them how to draw free hand; he assumed they knew.
A38: I don't think that the lecturer knew that we knew nothing about the computer because he didn't tell us about the keyboard, how to use this, how to double	She believes that because the lecturer did not explain basic but essential things about computers, it was wrongly assumed they knew these. She felt helpless.

click on this – we didn't even know how to double-click.	
A39: Well, in class you could ask the lecturer, and you won't keep that, you've forgotten. I will always forget what the lecturer did because she would say we must click there and then I'd click – okay, I'll click the B and everything goes bold. The next time I come in I don't know where she clicked. So that is why I had to ask the other students after class to do this for me and again and again until I knew you must click the B.	Although she could have asked the lecturer she did not because the lecturer only gave her instant instructions, not explanations that would endure and facilitate her learning. She turned instead to the other students who would model it for her repeatedly, until she understood.
A40: … but a lecturer is more, more advanced than us, but learning from a student is better if you are talking about general things like, like what I'm saying is the basic things.	She prefers learning basic things from other students – lecturers are too advanced. She makes an us and them distinction between students and lecturers.
A41: Because when you are talking as students you are more free, so it's different. Being free - I think that it, it helps to, to learn more. Because also the other students are free, and they are saying things whatever they are thinking.	Learning amongst other students is different - she feels freer. She is uninhibited and able to risk saying whatever is on her mind, because that is what they all do.
A42: … and if you are thinking that what the person is saying is good, you tell yourself you are going to keep it and you are going to, to use it.	She attends to what the other students say and judges its value. If it is useful she 'keeps' it, planning to use it later.
A43: (long pause) But [lectures are] not as free as when I'm sitting with students and talking to them as students.	She does not experience this same sense of freedom in a lecture.
A44: Oh, we talk our language. But if someone in the group doesn't understand, we speak English.	When talking amongst each other, she uses Xhosa unless someone doesn't understand. She thinks of Xhosa as 'our language'.
A45: Well, learning in your own language, I don't think it's very its very helpful, because… No. It's not very helpful because, the Technikon words, you can't use the	She feels however, that learning in Xhosa is not helpful, because the technical terminology – 'the Technikon words' – is not available. She feels she won't

Technikon words. If you try and say them in Xhosa, you definitely won't understand what you are talking about.	understand herself if she uses Xhosa.
A46: (giggles) Uhm,.. well, I don't know how it happens, but I think in Xhosa. It's when I'm talking that I try to explain what is in my head to, to into English. I sometimes, I find myself using a Xhosa name while I'm also talking in English (both giggle) because in my head, I'm thinking in Xhosa and I'm speaking English so, that usually happens, especially when I'm presenting.	She sheepishly confides that she thinks in Xhosa, but speaks in English. She is unaware of how this happens. When she talks she feels she is putting or translating what is in her head into English. She finds that sometimes she uses a Xhosa word even when making a presentation in English.
A47: No, I learn in English, but if I sometimes don't understand what is written, I try to translate it to Xhosa so that I can get a better understanding of it then I can,…. then I can study it again now.	She uses English to learn, but first translates difficult sections into Xhosa as this helps her understand it better.
A48: Well, I think [being analytical] it's just something that I just picked up here during my diploma, because it's part of what an industrial engineer does to analyse things.	Although she knows that being analytical is an essential part of being an engineer, she is unaware of how she became analytical - she feels she just 'picked it up'.
A49: Uhm, the Shatterproof project because we came out with different ideas, and we, we, we analysed each and everybody's idea then we're sure that the best idea is this one.	She recalls having to analyse other people's ideas in a collaborative project. They all contributed ideas, analysed them and reached consensus on which idea was best.
A50: Well, we wrote the report together, and we had to explain, we had to talk about what, what were we going to write, what are we going to say, and then if a person comes out with what to write, we will write it down, then we, we because we were taught about report writing so we knew we had to write all these things – terms of reference, table of contents.	They also wrote up the project report collaboratively. They talked about what they were going to write, then recorded ideas or sentences. Finally, it was organized in terms of the required structure.
A51: Yes, that's what I'm saying, we sit together, we say, say our views, so that we, we try to write it and then see if, if this is how we, we, if this is a good way of writing it.	They begin by 'saying' their views, which are written down. They then consider whether they are appropriately expressed.

A52: Someone, …we … we, we take turns and type it that's say, someone will type three pages two pages and then we, we're finished with it.	The typing up will be shared among them. Once it has been typed it is finished, there is no revision or consideration of the whole.
A53: I just think of myself as someone typing the others' work.	In this process she conceives of herself neither as a writer nor an engineer, but a typist.
A54: Well, I don't think it's that very good. Maybe if we had more time, or we – we had discussed it a lot as a group, maybe it would be a better report.	She is not really satisfied with the report – she believes that more time and in depth discussion would have resulted in a better report.
A55: Uh, well [I know an idea is good] if, if we say something and the others don't say anything, they don't correct you what I'm saying - we just write it, if they don't see anything wrong with what I'm writing, I just write it.	What is good is defined normatively – in terms of a lack of criticism or objection from peers. She does not conceive of good writing in terms of professional criteria or conventions, or in terms of the reader.
A56: Oh I always go to the library and take out a book that is going to show me the format of the report how to write it so then I'll try to write my report, like what I'm seeing.	She always gets a book from the library so as to have an example of a report in front of her. She has not yet appropriated the conventions or format but sets out to copy the format from the book each time.
A57: [Good writing] Uhm, you, you have to, to explain things. Explain technical terms so that if the person reading this is not an engineer can understand what you wrote. Ja, specially in a report you have to understand what is the purpose of this report, how you got all the ideas, how you investigated your ideas. It's very important.	She defines good writing for an engineer as being able to explain things clearly – including technical things to a layperson. She believes that understanding the purpose and explaining method are essential for good report writing.
A58: … because if you are writing for an engineer, surely an engineer will understand what you are writing because you use all those terms and technical words. But if you are writing for someone who is not an engineer, that person won't understand so you (have) to …to write plain English so that everybody will understand.	She relies on shared technical terminology To facilitate the creation of meaning when writing to other engineers, but resorts to ordinary English when writing for a lay audience.

A59: Not all of them [technical terms] but, some of them, some. It was. .. because during my diploma we are always talking about these words, and, the lecturers always explain to us that this word means this. We have to understand them because we, we're doing engineering.	She doesn't understand all technical terms, but through lecturers' explicit explanations she has learnt the meanings of some. Understanding these terms is essential if she wants to be an engineer.
A60: We, …we use the explanation [rather than the term] because like I said if you are not writing for someone who hasn't done engineering, that person will not understand about what the word means So, basically you explain it, and it's better to keep it if you know, know the explanation of words.	She seems to be more comfortable with the explanation rather than the term itself – as if she were writing for a lay audience. She feels better able to understand and retain the concept by using the explanation than by using the term.
A61: For an engineer? Oh, if I'm writing for an engineer, you may, you may use the words.	She knows it's appropriate to use terminology when writing to another engineer.
A62: I think I'll, I'll mix, I'd use general words that we use and because the technical words are more difficult, so, it's not easy to keep them so, it's not easy for you to remember them so, I would just use plain Eng- … if, if I remember the words at that particular time, I'll, I'll [use them].	She uses a mixture of technical and general words as she finds it difficult to take ownership of, or appropriate the terminology – 'to keep them'. If the words come to her at a particular moment, she'll use them.

Zayeed

Z1: We were taught there is a right way to do things and there is a wrong way. I think the difference between the right and the wrong way is the end result. If you know – if you strongly believe you are doing the right thing…that's the only way to do it unless somebody else tells you otherwise and gives a specific reason.	He was taught the importance of doing a thing the 'right way'. He differentiates between right and wrong in terms of result. He believes in an internal source of authority and believes in doing things his way unless he is given good reasons for doing it another way. He wants a good reason for accepting an external authority.
Z2: I don't really think my writing has developed as much as it should have because I look at other peoples' reports from in-service. I haven't done my in-service - so, basically I only had theory knowledge and no practical knowledge. I think the practical knowledge will help you explain things as well.	When he compares his writing with that of others – particularly their in-service reports- he believes his writing has not developed as much as it could have. He ascribes this to his lack of experiential learning – his knowledge is still all theoretical – and experience facilitates explanation.
Z3: We only do report writing here on the end of the semester when we get something to do, and if we do writing it's from the textbook. You stud and explain it in your own words.	Until now he's only been required to do report writing at the end of the semester. Although he does paraphrase it, it is all from the textbook, and amounts to knowledge telling.
Z4: I think [my writing has developed] because in standard ten you just, just go to a book and you research one book and now you research more than two books. And you studying something that you know of so the lecturer would not ask you to do something totally different as studying Analytical Chemistry.	His writing is different from school where he was limited to one book. He now incorporates information from more sources. Having focused on one field for a long period, has made him familiar with it so that he feels he has his own knowledge (he can now transform rather than just tell knowledge).
Z5: Now in school you did many different subjects, now you studying a specific thing so we have background knowledge from the past couple of months. You have studied at the Tech so you have drawn your own knowledge as well as you know what specific books to go to – what sites to go onto the Internet.	As he is not asked to write on unfamiliar fields he is able to draw on accumulated background knowledge, and also knows where to find relevant information in books and the Internet.

Z6: Our course has detailed methods of doing things, what reports you must write, how to lay out a facility, what procedures must be followed and in fact, it's very clearly defined in the knowledge. If you just came in you had to start with your practical first I think you would be – you'd be lost at sea. I think that's the most important part because if I was to go now into Industrial Engineering I would not know where to start.	He believes his theoretical background knowledge will direct him when he goes to industry. He regards knowledge as an independent corpus. He feels confident that if he follows the conventions and procedures he'll cope. He refers to methods, format and procedures that are 'clearly defined in the knowledge', without which a new comer would be lost.
Z7: I think the theory or theoretical knowledge is very important part because it's something you can fall back on, it's something you - once you do your practical you can go look up. I know I've done this I've learnt about this, this is the theory you might've forgotten it, but you know it's somewhere, you have done it.	He believes his theoretical knowledge is important to fall back on. Even things he may forget, he'll know is 'somewhere' because he's done it, and it's now part of his background knowledge. Although he may forget specific detail, the cumulative effect of the theory is significant.
Z8: He [Mr K] gave a set of guidelines to use in the first year. We should follow this type of formal system or format that will help us get better marks and help explain better, having a introduction, having a summary, having a conclusion, giving examples as well referencing it and then coming to an end conclusion, what the report is all about …	The set of guidelines to write a report that he received in his first year he still follows primarily for strategic reasons: to get better marks. He believes that will help him write a better report which he describes in terms of product, i.e. 'having' prescribed sections – not in terms of his performance.
Z9: Mr K brought us in-service reports, and he said, 'this how you gonna have to write at the end'. He was just telling us what at the end, how we should be and how we should be writing.	In his first year Mr K showed them final years' reports as models of how they should be and write at the end of their course. This is what Mr K presented by in terms of what it must look like, not what the writer must do.
Z10: And the report clearly explained of what he, what he'd done, and it basically showed minor steps to Work Study I. But not really concepts we could understand then, but we do understand now. I, I could see myself a bit in that but I saw	They looked at the various parts of the report to how the writer used the report to explain what he had done in industry. There were concepts there that he could not understand then, but which he does now. As a student he could identify with

experience I saw maturity, I saw writing with knowledge of understanding, that's what I saw.	the writer, but he was aware that the writer had more maturity, knowledge and understanding.
Z11: It all depends whether you're working in groups. You assign each one a task in the group – you'll ask the lecturer for more detail, what does he specifically want.	If he's working in a group, each one is assigned a task (no group planning) and the lecturer is asked to elaborate on his requirements.
Z12: There's so many different facets of something you can explain so even – maybe there's one thing and you're doing totally opposite thing it will totally clash with what he wants. You have to ask specifically what he wants and what does he mean.	He is very aware of the various ways one could approach a topic so believes it is essential to get clarity from the lecturer for whom he is writing, to comply with his requirements. He wants to be told by the lecturer how to solve the rhetorical problems implied by the "many facets". He does not attempt to engage on his own.
Z13: You have to be…how can I say…innovative. 'Cause if you're not innovative enough I don't think you'll be anywhere. Constant improvement, that is the thing.	At the same time however, he values being open and innovative. These are important values in attaining constant improvement.
Z14: Uhm, I collected information, the report was on world class manufacturing. We took out a few books, we researched the Internet, we went to a few companies cause world class manufacturing is practiced in the PE region. And then we took all our information and we sat down.	He sees writing primarily in terms of collecting information: by 'taking out a few books', searching the Internet and visiting local companies that practice world class manufacturing. Armed with all the information, they were now ready to begin.
Z15: I think this was a group project, we sat down from all the different [sources] we got what they – what they brought into the group, what experience they brought in, or maybe they done in-service, they could bring their particular knowledge if their company practice it. The lesser members could've also bring information that I might have missed.	The group members pooled their information, industrial experience and knowledge. Those who had no industrial experience are regarded as 'lesser members', who could contribute information he may have missed.

Z16: I think you can learn much more [from companies] than from books, because you learn how they do things comparing to other companies.	He learns more from companies than books because it's possible to make comparisons between different companies' applications of principles.
Z17: Books and things from the Internet are more theoretical, it's not face-on value. The person that might tell you- that might give you that specific detail, that missing word that affects you, that gets you to think more openly and widely. But in my case I think books are not really there to contact. A more person-to-person, interpersonal relationship is much better because he can explain, he will tell you more directly, maybe a practical means, hands-on experience or physically seeing the thing.	He finds people a more powerful source of learning than books and the Internet because a person could give him a missing detail or word to develop his understanding. He feels no "contact" with books. Learning person-to-person is particularly good when it also involves demonstrating or doing the thing.
Z18: [After consulting all the sources for the group assignment, the next step is] setting the assignment up. Er, collecting all the knowledge, doing a formal assignment, giving introduction, what is the body, what does it consist of, what was the assignment about, a conclusion, will be all the things that we done, the references.	Setting up a group assignment involves 'collecting all the knowledge' and producing or 'doing' a text that consists of a series of required sections. It is approached like a check list with information and sections to be ticked off. He regards knowledge as a commodity garnered and formally arranged.
Z19: We go back to the assignment - how can we improve it - before we give it in so it can look the best possible explanation of what we done and where we came from with this work and the understanding.	They then revised the assignment, improving it so that they had the best possible explanation of what they did to demonstrate their understanding.
Z20: Uhm, I think writing plays a big part [in learning], because I mean, you write out all the facts,…	Although he ascribes a big role to writing in his learning, he refers to it as a means of marshalling or recording facts.
Z21:..then at the end of the day your writing, you have to read over what you write, you can't just go write anything, even if it doesn't make no sense to you, how's it going to make sense to somebody else? Once that people read, they must go, ' oh, I understand that now'. You must	In revision he refers to making sense. Because the text needs to make sense to the reader, it must first make sense to him (writing as doing). He acknowledges the social function of writing: explaining to others. By accepting his responsibility as writer to make the reader understand,

most probably understand it the best, because you explained it the best in your specific writing.	he commits himself also to understanding and in this way writing contributes to his learning, to his understanding.
Z22: Not really, because like I said, I'm er, more interpersonal. I will like know to what the person is thinking and why they do it in that specific manner. To understand something there and then will be more beneficial to you than writing down something unless it's for a report.	He does not write as a means of learning because he prefers learning from interaction with people. So although writing helps him understand, he only writes for a lecturer – when he has to. He prefers understanding obtained through interaction to writing (writing not as doing).
Z23: Uhm, I think – I, I kept all my books, kept all my notes, all my books – I do lend it out to friends but I- I do want it back. I keep those as my references. All my notes are there, background knowledge, my notes are there in my room if I want ever something I just turn back and know it comes from that particular subject. I just need to turn back and read what I wrote there.	He keeps his old notes and books – if he lends them to friends he wants them back. These constitute his background knowledge which is stored in his room where he can refer to them when he needs to. His background knowledge, (and orientation in the field) is stored in his room, not his mind. His writing serves as a method of recall.
Z24: You might…one important aspect is that the lecturer might ask you something in S4, but it actually links all the way back down to S1. That thing that you missed and that - that's the complete link once you get that link it's like the building block to your new house.	Work that is covered in the final semester may link all the way back to the first semester. He has adjusted his understanding and fills in the missing bits. He feels that initial understanding is significant for later learning, and is starting to fit together all the loose information into a whole.
Z25: I think we became accustomed to it [terminology]. At first you have, you had to learn it parrot-fashion, or you had to read over it to understand it.	He has become 'accustomed' to terminology. He believes that initially he learns it parrot fashion, or reads it repeatedly to understand it.
Z26: I think understanding plays a big part. If you do not understand something, you'll never know it up until today. If you don't understand the basic concept of anything, of Work Study, what Work Study is there for, I don't think you'll get what Industrial Engineering is all about.	He makes understanding a condition for knowing. Without understanding certain basic work study concepts, he'd never 'get' what industrial engineering is all about.

Z27: I'll go check it out or I'll go ask the lecturer why. Why do you use that there – why, why, why, 'cause that's why we here for: why, why, why? This, why that? Where - when do we use this? Why do we use it?	He is quite comfortable to approach and question a lecturer about what terms mean and how they are used. He regards questioning convention and usage as an important part of his learning.
Z28: There's facets we haven't learnt yet, and I talk onto that point. That might a bit clash with the knowledge I do have, it might contradict to what I'm actually saying. But sometimes the lecturer knows a bit more about that specific subject and then only tells you afterwards, 'no, but you're wrong'. But then, that's the way you find out, that's the way you learn. You have to make a mistake to learn.	At times he ventures to talk about aspects he has not yet learnt about and finds that his own ordinary intuitive views clash with what the lecturer points out. He is then able to adjust his mistaken view to comply with the lecturer's view. He believes that venturing to make mistakes is an affective way of learning as it gives him the opportunity to adjust his intuitive view.
Z29: Ja, sometimes you have to learn in a group specifically the subjects which are so-called difficult, Maths and Physics, Mechanics and Strength of Materials. Your understanding of the formula, he [friend] might explain it better-better to you than the lecturer might do. But he understood it from the lecturer, that's how it works. You have to learn in a group he might get the answer quicker than you.	He sometimes learns in a group – particularly for what he experiences as difficult subjects. He believes that a friend can sometimes better explain formulae than the lecturer. The friend, having grasped it from the lecturer, can act as an extension of the lecturer.
Z30: …specifically from my one friend that was studying with me. He has been working for nine years now already, and he brings a lot of experience into our friendship. I think through our studies we've become best friends: he brings his knowledge of his working experience, and I bring my knowledge.	He became good friends through his studies with a classmate who had been working for nine years, and whose experience he values. The friendship is built around their shared knowledge.
Z31: I think his knowledge of things and the way he explains things are much more clearer sometimes than the lecturer.	He feels that his friend explains things more clearly than the lecturers. He trusts him because of his experience.
Z32: Basically of how he, of how we-I think we done a layout assignment and we done it together. I'm positive of it, and then he said, 'But no, why don't we do it	They had once worked on a layout assignment together where his friend had suggested an alternative way based on his experience. Initially he questioned his

this way.' I questioned the reason why we done it like that so he said no it would just be much easier. And basically as I went home I put it down and- that's why he done it like that. But basically we done it at his work so we had an added advantage obviously.	justification, but followed his advice nonetheless. Ultimately he was satisfied because their assignment had the advantage of his friend's experiences.
Z33: You have to obviously you have to follow specific rules and guidelines. You cannot go outside of them then obviously, but I said rules are meant to be broken. But not certain rules.	He is aware that certain rules and guidelines he must follow, but believes that some rules can be broken.
Z34: Er, I think "The Matrix" was a perfect example [of being willing to break the rules]. We all are a bunch of robots I think. That's what we are. Each and every person imitating the same person, and then the one part they specifically show everybody wearing a black suit and a black tie with a white shirt. I mean why doesn't one person wear a brown suit. Do we all need to wear that?	He refers to *The Matrix* to illustrate how easily people conform without questioning rules, or exploring individual ways of doing things. He is uneasy with the idea of convention and control and wants to challenge convention.
Z35: And that's where the computer comes in, in "The Matrix" because he wants the people to follow a specific path, they mustn't venture out of that specific path. We are meant to think er, with blinkers on, like a horse. Once you take the blinkers off you see the broader picture: but you can do things like this and it's still right. There's many way of– many ways of doing things, but there's one way of, there's one right way. But there's also one wrong way of doing things.	He questions whether we all need to conform, whether we cannot 'venture out of the specific path'. He believes that conventions are like blinkers – narrowing our awareness of options. He feels it is possible to break with convention, do things differently, but still 'right'. He is aware also that this brings the possibility of doing things in a 'wrong' way.
Z36: There are some fundamental rules that have to be followed and once you follow those rules they lead you straight to your path.	He feels that within the guidelines there is scope to set things up in a way that allows him to set his own path.

Z37: I think that's [my awareness of change and improvement] basically what we've learnt in the textbook, what the lecturers have taught us, it's in the theory, it's in our course. You change because you acquire knowledge.	His professional awareness of change has developed theoretically – through reading textbooks and interacting with lecturers. He ascribes his change in awareness to the knowledge he acquired.
Z38: As a person I think I've, I've learnt to open up, because I learned that the best way to get information is person-to-person. Understanding what the person said, understanding what they thinking, why they doing it that way and then going back to theory as well. But talking to somebody, understanding where he comes from.	A personal change he has undergone is the discovery that he needs to be more open in his interaction with people. This is the way he learns best. He tries to integrate his theoretical understanding with the other person's thinking, and to understand the other's frame of reference.
Z39: I found out I enjoy sitting in class debating things or asking questions cause I find that so much fun. I think coming to class has been a slow change as well as a slow build-up to where I am. It's not been one specific spark where everything has immediately changed overnight	He has discovered that he enjoys debating and interacting in class. This happened gradually since his first year, and he cannot ascribe his realization to a specific incident or 'spark'.
Z40: In class we debate why. 'Why do we do it that way, why can't we do it this way?' 'Why was that done?' 'Who was he, why was he famous just because he said that?' We think, why didn't we say that, why didn't I say that - I mean it was so obvious.	The class discussions relate to procedures or people in engineering. He often thinks that he too could have come up with the ideas of famous engineers. He realises that some ideas are in fact very obvious, and yet beyond the ordinary person.
Z41: Ja, I think that's [experience] where everything comes from. But I've also learnt to adapt. I haven't done my in-service, so learnt to adapt to the theory.	Experience is important to him. But as he has not yet done his experiential learning, he has had to compromise, i.e. rely on theory only to learn.
Z42: I don't think [I consciously change the way I write]. I think it's just become, like I said from the background knowledge I've learnt to write like an engineer I think now.	He's not aware of consciously changing the way he writes reports, but feels that his 'background knowledge' enables him to write like an engineer.

Z43: [Lecturers] brought me to that point now where I'm thinking, like I'm writing like an engineer cause of the amount of reading we do, the theory we learn. So I think the words – how we use the words has affected my writing.	The lecturers, his reading and theoretic learning have contributed to his thinking and writing. He thinks that the way the words are used, affects the way he writes.
Z44: …but they [lecturers] don't comment directly by saying you should improve, or you mustn't use slang. They wanna see that you explain yourself correctly or er, grammatically.	Although lecturers don't comment directly on language usage, he believes they want to see that students can express themselves 'correctly', a concept he equates with 'grammatically'.
Z45: I would, I would like to write more descriptively and more figuratively as in explain the thing in such a way that even the person as yourself who doesn't know nothing about it specifically would understand it. And the person who is an Industrial Engineer understand it as well - but he should have a better under-standing of my writing, more than you.	He would like to write more descriptively and be able to explain in a manner that both lay people and other industrial engineers understand. He is aware of the different ways in which lay people and engineers would understand his writing.
Z46: I think I learnt writing skills as I went along. Ja after, even after the course - we had to write a project, we had to write a conclusion and then that's how you learn - from every time you doing it. The more projects you do the better you become at it.	He believes he learnt his writing skills 'as he went along' even after completing the formal course. He learnt every time he had to do a project: the more he did the better he became at it.
Z47: Basically I'd say there's many, there's many role models for me. But, I think basically my main role model is our Prophet Mohammed and uhm, the way he does things because er, our religion has so many facets - there's to do with business as well.	He has many role models, but his religious role model, the Prophet Mohammed is the main one, even in his professional learning. His religion deals with all aspects of life - including professional (business) aspects.
Z48: I've learnt from him how you respect people. The more you respect people, the way you do things, that's become a very important part – you have to respect another person's values as well as another person's religion. The way you do things, the way you approach things.	The way he does and approaches things is determined by his respect for others. This he regards as a religious rather than professional value.

Z49: Ja, [I've made a connection between my religion and the theories I learn] I think the values er, what have only been discovered recently, has been in our religion for many, for over 1400 years, but it has never been brought up. I made, the connection was there: er, how to treat workers. How to treat them correctly they only discovered now recently, and the Industrial Revolution is over 150 years old now. Why hasn't anybody come forward with this? I made the connection, but I haven't made the connection physically yet as in producing, but my connection is there. Maybe I am the person to bring it up.	He sees a connection between his religious values and theoretic knowledge. He refers to the Muslim guidelines on treating workers which have been around for 1400 years, but have only been 'discovered' by industrialists recently. To him there is a connection between his religion and his profession. Although the connection between engineering values and religious values has not been generally recognized, he believes he may be the person to point it out.
Z50: If I break those laws, I'm breaking my religion, I will be punished at the end of the day so I'm trying to integrate that into my self-study. Ja, I think the connection is there - like I said before, there are some values that are basically from my religion.	He believes he needs to obey his religious laws in his professional life or he will be punished. He thus tries to incorporate them in his professional studies. To him the values inherent in his religion and engineering do not conflict.
Z51: Er, I think there is no limits in Industrial Engineering cause I'll say your limits is about, basically is your personal self, outside your work, as in the way you behave.	He defines his professional limitations in terms of his personal attributes and behaviour, not professional constraints.
Z52: You might have the biggest knowledge, you might have the most knowledge in the world, but if you don't have respect and you don't limit yourself as in terms of respecting somebody else, you won't come far and that- and that's what I've seen.	To him knowledge is subordinate to respect for others. No amount of knowledge can compensate for a lack of respect.
Z53*: Ja, certain respects need to be paid. But if that person steps out of line, you have- you have that – the right to put him back into line.*	His respect for other people will not prevent him from performing his professional responsibilities – if someone 'steps out of line', he has the 'right' to put him back in line.

Pumeza

P1: You have to read, you have to read then understand because if you just read it you sometimes you - you just read it then you forget what you read about. So when you have to read it, make sure that you make notes of the important part. Then make sure that you understand it - you can put it in your own words. Yes.	She feels reading a text does not result in understanding unless she makes notes as she goes and deliberately tries to understand. She equates understanding with putting it in her own words or paraphrasing.
P2: [When starting to write] you can sometimes use both [own and text], but er, I think using your own words for some things, then continuing some words like the technical words on the other side, but using your own words, or using a language that you know.	Although when she writes, she could use her own words and words from the text, she feels it is better to use her own words where technical terminology is not required. Her own words are a language that she knows, technical terminology not.
P3: I'm not necessarily saying it's [summarizing] very easy - I'm still learning! But now it's easier to me than it was before. I had to use it in my training. Every time I compile a report I have to do a summary.	She feels that although summarizing is not easy, it has become easier with practice. In industry she had to write a summary every time she compiled a weekly report.
P4: No, nobody told me [how to do a report] but what happened is, it was me and my colleague. So, we just talked about it, and how to do it. Then, he explained to me what he thinks. I told him what I think - then, at the end we came up with something. The first one we did both. Then, the other ones then it wasn't difficult.	She doesn't recall being told how to do a report, but learnt by discussing the first one with her mentor. They just talked about it, both contributing ideas, and came up with something. The first one was difficult even though they had done it together, but subsequent ones were easier.
P5: I think now that I'm coming back from industry it's much easier. Some of the things that I'm doing now I can relate to. Especially because at first I didn't understand why I had to do communication because I'm an engineer, so I don't need to do administrating work I don't have to write. I'm not going to be a secretary. So now that I've been in industry, I know now exactly why I had to do the course.	She feels that learning is easier since her return from industry as she can now understand the significance of things. Previously she didn't see the need for doing Communication I as she was going to be an engineer, not an administrator, so felt she didn't need to do writing.

P6: [A presentation] It's easier in class 'cause they are my colleagues. Most I have been with for the past two years, three years now. So, in industry it was my first time and I have to do a presentation within one month when I was there. It was the group of about three managers. Mm, it is very scary. It is, especially when they are all there. So it's, it's not really difficult, but it's all about …who you are going to talk to in the relationship.	She finds it easier presenting in class as she has know her classmates for three years. When she had to present in industry for the first time she was tense and scared as her audience included three managers. She is not stressed about the presentation content itself, but the audience. Having a familiar relationship with her audience makes it easier.
P7: So, I was still tense learning everything in my head to do the presentation.	She coped in this stressful situation by memorizing content.
P8: It, it's comfortable now, you know exactly … what to say you know what their reaction is, you are willing to listen to their questions - not like the first time because you don't know what they're going to ask. And you're not even sure if you know exactly what you are doing, but the second time it's easier. You know, you're prepared and you're relaxed.	She feels more comfortable about making presentations as she knows what their reaction is likely to be. The first time she was too nervous to benefit from the questions they asked. (Too high an affective filter too learn). She feels that she wasn't even sure what she was doing. Knowing what to expect from the audience helped her relax.
P9: It gives a lot of confidence because you know that you can do it no matter what. You are going to do it, and you can do it. You know that you did it at the Technikon, now you can do it here. It's no problem.	Her confidence in presentations comes from knowing she can do it and doing it – at the Technikon and also in industry.
P10: Now that you have confidence you can also ask questions. It's easier for you to ask questions - also easy to listen to other persons because you are confident.	Confidence was important in her classroom participation. Once she gained confidence she could ask questions and listen to what others in the class were saying.
P11: Then sometimes when you, you are talking you just consider it what you are saying, and you, you are not really into listening what's the other person has to say because you are nervous and you want to get over this, the presentation part. So sometimes it does affect the listening.	At first she had been so nervous about her own presentation, even listening to others was difficult. She was just aware of wanting to get her presentation over, and thus derived no benefit from listening to the others and reflection on their presentations.

P12: Er, I, I won't say difficult, but ja, different. It's because, my mentor was a man and I will gather, I will do some – everything. And he'll say, 'are you sure about what you are doing?' Then (I) say, ' yes, I'm sure'. *Then say, 'okay you can do it'.* *'So why're you asking if I'm sure?'*	She describes her experience in industry as different rather than difficult. She suspects her mentor doubted her professional ability because she was a woman and she was affronted when he asked if she knew what she was doing.
P13: So, I think the treatment that they were giving me it was almost, sort of, sometimes … Ja, they knew that I'm an industrial engineer, but they have got … but she's a woman.	She is not able to specify why, but some how she feels that while they accepted her credentials as an engineer, something in their attitude showed that they were uneasy with her being a woman.
P14: Also in the presentation, with the managers, they are asking me questions so that they, they, they really know that you (know) what you are talking about, so they have to discover what…Do you really know what you are talking about?	She felt she was constantly tested by them. She knew that the questions they were asking her were just to test her, they already knew the answers.
P15: Uh, I always say I treat myself as the person I want to be. So I want to be, I want to be an engineer so, so that's why I'm treating myself as an engineer. Even now that I'm studying, I'm not saying I'm a, a student, because I want to be an engineer. And so I'm acting and treating myself as an engineer.	There is a duality in her being - she regards herself as an engineer, but is aware also of her status as a student. She treats herself as an engineer because that is what she wants to be.
P16: So when I was in industry, there the managers knew that I was a student but in the department that I was working with, their industrial engineer had resigned the last week. I was the only person there – their industrial engineer. So, they were dependent on me and I had power over them.	In industry the managers knew she was a student, but as the industrial engineer had resigned, to the other people she was an industrial engineer. They depended on her, and she felt that she had power over them.
P17: And my mentor would just sign everything I wrote. But with the other students, they have to read and make sure that exactly what they wrote is, is what they did, then sign.	She was pleased that her mentor signed everything she wrote in her logbook without query. Other students' mentors checked more carefully.

P18: Also in certain jobs, they can't do some jobs without asking their manager's direction. But I had the whole department to myself, so every decision I take. I don't have someone to ask.	She is proud about not having to ask permission to do things as the other students had to. It made her feel more like an engineer than a student.
P19: I really felt comfortable, because I, I knew that I did the course at the Technikon – I'm prepared for it.	Her confidence came from knowing she had done the course and succeeded at the Technikon.
P20: Sometimes it's not really exactly the same in the books as it is in the industry now as the technology is changing Like at the Technikon we have to do a lot of thinking. Operational Research - we have to do simulation and everything else. You have to think and know everything, but in industry you have to just record the data in the computer, then the results will come automatically. That's, that way it was very easy but now at the Technikon record the data, then calculate everything, then come with an answer.	She is aware of differences between learning in an academic context, which requires more thinking, and a practical context. In the Operational Research class she was taught how to calculate from data she collected. However, in industry she did not need to perform the calculation – merely to feed the data into the computer for it to be calculated automatically.
P21: Er, it, it was a big change because I'm coming from high school with the other languages - other languages of mine cause I was doing maths and science. Then I had the scientific language, but it was a bit of a scientific language.	She found a big difference between Technikon and school. Even though she had done maths and science and had some scientific language, she felt it was inadequate.
P22: Then, when I came here, then they expanded on my scientific side so it was really difficult. You have to understand the, the terminology you have to understand the language. It was English, but different terminology, different use of terms.	At the Technikon 'they expanded' on her scientific side. She experienced this as something that was done to her, not something she did. She found this expansion difficult as it involved understanding the language differently.
P23: You have to hear it in class first, then you can work with the book to expand your knowledge.	After hearing the terminology in class first, she goes to look it up to add to, or 'expand' her knowledge.

P24: There, there is a word that they are using in S1 mechanics They're using 'centroids' (laughs) and it was, 'How are you going to calculate centroids?' Then I say, 'what is a centroid?' Then he explained it, everything that a centroid was. But then I went through the books to find exactly what is the meaning of the word. Then they say it's the centre of gravity. Then I say, 'oh, that's the easiest than the, the one they were using in class!' But the one they were using in class, in class is a mechanical term.	She recalls clearly and with amusement, hearing the term centroid for the first time. They had been asked how to calculate centroids, and she asked what a centroid was. The lecturer explained what a centroid was, but she also needed to consult a book to find out exactly what it meant. The book explained it in terms of the centre of gravity, which was a familiar concept to her and she felt that this was an easier term than the one used in class, which was a mechanical term.
P25: I'd heard of centre of gravity in high school, but I didn't know centroid is also the same word. So, you have to, to change.	The term was a new way of naming a concept she had understood at school. Realizing she had to change her understanding along with the new understanding, was a significant discovery for her.
P26: It was a big problem, big problem, because the lecturer didn't tell us that it was the centre of gravity that we know from high school. He just said it's the centroid and explained everything. There was a name centroid in the textbook, then explain it centre of gravity. I knew centre of gravity. If the lecturer could have said, 'centre of gravity', even these words, I could have understood it.	She experienced his explanation as problematic because he had not referred to centre of gravity in explaining the term centroid. Had he done so, she would have understood the term sooner, and the function of discourse. She felt a bit indignant.
P27: Then, (when) I understand it further, I told the lecturer, then say, 'No, centroid. Centre of gravity is a scientific word, but you're mechanical, because we're mechanical you have to, have to, to say it's a centroid.' It's a centroid. Because we're dealing with shapes and everything then when we're talking about centre of gravity, we're talking about something general. So then if you say it's a centroid, then another mechanical engineer will understand what you are talking about.	After she had discovered this connection for herself, she confronted the lecturer and asked why he had not made it. He said that it was not an appropriate mechanical term (discourse) and that she was required to use the discourse to show that she knew the implications of the shapes of objects. Centre of gravity was something 'general' and did not contain the idea of shape. The lecturer told her she needed to use the discourse to signal to other engineers that she understood the full implications.

P28: I'm comfortable with the words now – specially that there are new words that I heard from industry, that I didn't hear from Technikon. So now that I've come back to finish, now I'm making sense of them also.	She feels really comfortable with the words now. Now that she is back in class, she is able to make sense of industry words. She is integrating her unexplained experience with formal learning.
P29: At the library we do have engineering handbooks with all, all the words, all the mechanical engineering words. So sometimes when I hear a word that I don't understand and it's used in mechanical engineering, I just go to the library for the handbook.	She makes a point of following up the meaning of a word in an engineering handbook.
P30: Yes, it's better because when, when you read the explanation, it explains even the implication, where you can use it and everything. Then it's easy because you know, okay, a term like this has been used to something else. You start to understand it, then you use it.	She feels if she reads the explanation and understands the implications and how it is used, she is then able to use it with confidence. She wants to understand it before she uses it.
P31: (Smiling) It's something great, cause you know you're using this term. You didn't know it before, now you know it, then you know the meaning of it. Now you know to put it in a sentence, and write in that sentence. So – it feels great. It's like learning a new language.	She feels great pleasure when she can use a term and know its meaning. She equates being able to use it in a sentence with the experience of learning a new language.
P32: It won't be a problem, but it depends entirely on the lecturer. If you know what the type of lecturer that person is, if the lecturer is going to understand what you've written about. But it's a different case if you know that your lecturer is not going to mark your scripts, then you have to put things as they should be.	She doesn't always use the appropriate discourse, but varies her usage depending on audience. She sees her audience as individuals, not as members of a discourse community. She relies on personal rather than professional considerations in her audience analysis If she knows that the lecturer will accept everyday language she uses it.
P33: Like, like, you can't say centre of gravity, because the other person will say okay, maybe you, you've mistaken the shapes which means the whole thing is wrong, but if you are saying centroid they can know you've taken the shapes into	She knows that she has to use the mechanical discourse to signal her understanding of the field.

consideration so that's okay.

P34: There, there are things that sometimes you imitate, specially from the lecturers. When I was here my lecturer used to have a time study sheet. He would prepare the time study sheet in the way that he knows – this is the first, second, third reading. From left to right. Then at, at the industry they were doing it like from top to bottom and said, no, but, it's not appropriate for me. It's not like I don't understand it if I'm not doing it top to bottom. So it's better if I just imitate my lecturer – do it from left to right, and it worked for me, rather than using the top to bottom.	She imitates things especially from lecturers. She followed the way her lecturer showed her to complete a time study sheet, although in industry it was done differently. She feels it's appropriate to follow the lecturer when the two methods seem equally functional: what the lecturer knows becomes what she knows.
P35: Yes. You have to take the two versions then, sometimes you can … in the two versions, you can see okay, this is right and this is right, then you can put the things that you see right, together, then you have your, your own choice. You feel very good when you have your own version.	Sometimes she is able to consider two versions and takes what she sees is right from each to make her own version. Being able to judge an approach on its merit makes her feel good.
P36: It's very good to, to have your own version of things because, it's easier to explain, it's easier to, to work with your own version than it is to understand someone else's version.	Having her own version is important to her as she finds it easier to understand and to explain to someone else. She knows, rather than has information about.
P37: Sometimes there are standard procedures - when you have to do something like this, there is no other way. When it's something that's not a procedure then you can do it the other way then there is no problem.	She's aware also that at times there are set standard procedures to follow, and no other way. But if it's not a set procedure, then there's 'no problem' doing it her way.
P38: Our lecturer showed us how to rate people when the workers are working. Then when we we're doing our projects in North End, the supervisor told us just rate them all 100%, then from there, just minus. Then our lecturer said, okay, just put them all 80%, then if you see they are	She is aware of different sources of authority in different contexts, and recalls with amusement the difference between the way her lecturers showed them to rate workers' performance, and how it was done in industry.

performing well then you just add (Laughs). So now we're in industry, then you see okay, what are you going to do? Our lecturer said we must rate them 80%, then with the industry it's better to do it 100%.	
P39: So you have to choose between the two measures. Okay, why don't you just don't write, don't put in a rating then add or minus. Just see them, then put in an extended rating for all so that is fine.	When faced with a choice between the two ways of measuring, she used neither, but developed her own way of getting a rating that worked fine. She feels confident enough to be her own authority.
P40: After I did the course, like I kept all my modules. And I had the textbook. So when I had to do the reports, our Department, they put out a pamphlet about how to do an assignment. So putting them together then you have to just learn that you need practice.	She has kept her handouts and textbook from the Communication course and consults these along with the guidelines developed by her department, drawing on both to write. She distinguishes between the Language and 'her' Department. She adds that she needs practice to learn.
P41: How do you know when it's correct?] What is correct: the project or the writing? The writing. I think it…. If it's something (laughs).	Her request for clarity indicates that she thinks that content can be correct, on its own, without the writing. She's unsure about how she knows when it's correct, and is somewhat amused by the concept of knowing.
P42: I was showing it to my mentor all the time I was even if you, even if I finished with writing it, then I, I do everything to it and give it to my mentor and say, 'read it and then tell me what you think'. Ja, he did, did comment what I was writing, then, yes, I took his comment into consideration and made some changes.	She always showed her writing to her mentor, asking explicitly for his comments and incorporating his comments. The only way of knowing if the report was correct was through his comments.
P43: So it's really necessary to, to have a second opinion, to know what the other person is thinking. I learnt that what you are writing - It's not always right for the other person, so in any way you have to, to make it right also for the other person reading it.	She was unable to judge for herself from a reader's point of view, but because she realised her reader's meaning may differ from hers, she sought out what the other person was thinking. She knows she needs to, but can't quite consider her writing from a reader's point of view.

P44: I was checking his work Specially when we, when we had to do presentations. I will, I will present to him, and he present to me. I'll pretend that he, he's the manager then and present to him.	In turn, she checked his presentations. They pretended to be the manager for the other to practice his or her presentation.
P45: What, what was very nice and content about us was because he was in another field and I was in another field. so we didn't know exactly about the fields we are in. So, he was interested in what, in what I'm writing I have to write to be specific so that he know exactly. Ja, he understands quickly what I'm talking about.	The fact that her mentor was in another field and that they didn't know exactly about each other's fields she found useful. This forced them to write very explicitly – as if for a lay reader - so that the other could understand. She used ordinary words to explain herself, and did not assume prior knowledge.
P46: My relationship with my mentor was good, good compared to theirs. He is, he was in his third year of employment so he was still young. I, it did help me learn because I, I always ask him for, for if I don't know a thing, if I, if I have a problem with something - he's always available for me, to answer my questions. Even if I have a problem, then I can tell him that.	Her mentor was only in his third year of employment, and she feels that this contributed to the good relationship she had with him. She could ask him anything she needed to know and could even tell him of the problems she had. This openness made it easy for her to learn from him.
P47: They [factory workers] were difficult some of the times because you'd find a person who is older, or old to my mother's age, and sometimes I have to change their working style.	She found working with the operators more difficult – particularly as she felt they were her mother's age and she needed to tell them what to do, to change their working style.
P48: Sometimes I have to tell them that it will be better if you can do it, do this like this, not like this. To save time or to save costs or to increase productivity, then, then you find that these fellows say, 'I was born earlier that you. I'm very older than you. I've been here for more than twenty years – when you were not born yet' and all that stuff, so they tell me that you cannot tell them to change. Because you are young. It is difficult especially in our culture cause you have to respect them - they are old.	She found they resisted her attempts to improve productivity or cost efficiency (her professional values and commitment) on the grounds that they were much older than she was. The expectation that younger people defer to older people is a cultural value she shares with them.

P49: You can, you can speak to him- if he speaks to you, you have to shut up and listen, and heed what ever he says to you. So, now I'm in industry, I know and I have to tell them what to do – that's my job. So, that's when you have to, to at least create a, a relationship.	Their shared culture required that she defer to him (respect him) by shutting up, listening to and heeding what he has to say. However, in industry she needed to tell him what to do – 'that's my job'. She overcomes the tension between her professional and cultural values by creating a personal relationship.
P50: I think I'm both [young woman and industrial engineer] because I'm a young woman - I'm a young woman engineer talking to an older, older employee. He has to know that's the relationship. He has to know that I have to do my work then at the same time, I'm respecting him.	She defines the relationship between herself and the workers in terms of her dual identity as a young black woman and an engineer, i.e. both culturally and professionally. She believes that in the context the worker knows the nature of that relationship and that although in her professional capacity she is telling him what to do, she respects him.
P51: You have to tell him that you, you understand what you are talking about and you have been to the Technikon and you know what you are talking about. And at the same that you know that time you have to compose that message in a way that he'll know that you are informing him and at the same time you are respecting him.	She needs to establish her authority as someone who has been to the Technikon and who has professional expertise. She is aware of composing the message in such a way that it conveys both information and respect.
P52: It's very difficult. It's really really difficult because, specially being a black woman because, ja, our culture… so you have to sometimes … like when I, I'm doing my work, I have to be the other person, which means I, I'm also including my professional side. Then, when we are during lunch and during breaks, I have to be their, their woman they know.	She struggles to describe the difficulty she experiences in her job as a result of being a black woman. Her culture requires that sometimes she has to be another person to perform her professional tasks. While she is off duty, she can be the woman they know. She experiences two separate identities (social and professional).
P53: Sometimes the other men are my neighbour and I tell them at work what to do! Ja, [at home] then I have to be the young woman. Yeah, I think that is something I have to understand.	At work she may tell them what to do, but at home she is the young woman. She is accepting of her dual identities - she takes it as a given in her life.

P54: The, the difficult part is when you have to convince them that you are doing your job, but then at the same time you still respect him. It's not that difficult with women working in the plant. They are very understanding, but it's more with men.	This obliges her to do her work in a certain way. It becomes more difficult because she must show the men that she respects them while telling them what to do. She finds women easier to work with.
P55: I don't have to listen to him [in my professional capacity]. At home or at a social gathering, ja, but now I'm at work I have to come and give my professional side.	She feels no need to defer to a man in her professional capacity but she would at home or at a social occasion.
P56: So at the same time if, I am explaining everything that I'm going to do, to him clearly, then I think I'm doing my professional side. I am being professional because you tell the person that you are going to do this service and why you have to do it. Then after that you can just give orders. Then it's your job – you have to do it.	She believes that by explaining things clearly she is able to establish her professional status, and having done so she is able to 'just give orders'. Then it's her job – she has to do it. She moves easily within her identities as a woman and an engineer (she is not silenced or disempowered).
P57: Uh, when I'm alone …ah… I'm an ambitious girl (laughs).	When she's alone (neither social nor professional situation) she thinks of herself as an 'ambitious girl'.
P58: Yes, I do feel it [professional] because when I'm alone I'm always thinking about what I'm going to be doing in five years' time. So, which means, what I'll be doing in five years time is based on my professional side.	It is as if she has two sides or identities, and she thinks of her future in terms of her 'professional side'. Where she sees herself in five years time is based on her professional aspirations.
P59: Yeah, I can switch back because yeah, I'm still living… I'm still in that.	She can switch back and forth between her two identities, as needed. Her cultural identity is still real to her, she lives in it.
P60: It's the first time I've been in a class with lots of women. Yeah! It feels really good because when I started we were only three, three – only three women in class. It's more comfortable now. I don't say it wasn't comfortable before, it was but now it's even more open, more comfortable.	Her final year is the first year where there are more women than men in the group. It feels 'good' compared to her first year when there were only three women. She was not uncomfortable then, but feels that it is more comfortable, more open, now.

P61: NO, I don't have a problem [with men in group work] I can work with anybody, I don't have a problem as long as we are in a group.	She doesn't mind working with men in her group at all. The gender composition of the group makes no difference to her.
P62: Yeah –er it depends because some, it depends on what you are learning. Cause if you are doing maths it's easier to do it in a group –subjects that needs calculations and discussions it's easier. Then there are the theory subjects where you may have to study all by yourself.	Her ease of learning in a group depends on the subject she is learning. She finds it easier to do calculation-based subjects in a group. In theory subjects she prefers to study all by herself.
P63: Yes, there is a part that they are playing a part, because S1, you see we all, we didn't know nothing! (Laughter) It was all new! Everything we had was new, so now we have to later mix in a group then study. So, it depends on what the other is understanding.	Particularly in her first year when she –and the others - knew nothing and everything was new, she found group work useful. She drew on what the others understood.
P64: Sometimes you see that the chapter you didn't understand clearly in class, then the other person who did get the information, then he just tell you what did happen. So, it's really is a necessary experience.	If some one in the group understood – 'did get the information' – he tells it to her. She talks about learning in terms of getting and telling information. This interaction was a necessary part of her learning.
P65: Most of the time we just speak in our, our language, in Xhosa. Then, maybe we're in a group where there are the Zulus and the Sothos, and we don't understand what they're going to speak, we speak English. I'm comfortable in English.	Although the interaction in groups is often in Xhosa – what she calls 'our language' – when the group is not homogenous, they speak English in which she is quite comfortable.
P66: Also in my first year, 'cause I'm doing a scientific course. What would be a name for… centroids in Xhosa?	Even in her first year she was comfortable using English because her course was 'scientific' and she didn't know the terminology in Xhosa.
P67: Sometimes his assignments, I would do earlier. Then if it's due in two weeks time - I will spend the other week always going to him saying, 'is it okay?'…. Going to Mr K in advance, so that I know really, exactly what he wants.	She started submitting her drafts to Mr K to get explicit feedback and direction. She wanted to get confirmation from him about whether she had met the task requirements.

P68: Cause if he tells us in class, explains in class, 'I want it to be like this', I think okay, I understand, but at the end, when I've put in all the information he gives in the assignment, he says, 'No, this assignment is poor. You haven't done exactly what I asked you to do.'	Despite her effort to follow his instructions and to put in all the information, her first assignment was returned with a comment that she had not met the task requirements.
P69: So on the second assignment I decided, okay, I'm not going to, to just stay in class and listen to him what he wants, and what's to be done, the next thing I'm going to take it straight to him and say, 'okay this is what I've drafted so far. So how do you want it to look?' Yes, I asked him and they [marks] were getting better and better.	She made a deliberate decision not just to follow class directions, but to engage him in a discussion of her draft. She was acutely aware of the need to present work that complied precisely with his demands. She had realized that marks were awarded not for effort or information, but compliance with task requirements.
P70: I've been following his career, so I know that he. All, all the degrees and so on, so he's really a role model.	She regards him as a role model and follows his career and professional development.
P71: They're all making a contribution but what was important with Mr K – he would tell me that I really need to, to do something about my writing. He won't just give me my mark and fail and say you have failed this, then you can go. He would tell me, 'your marks are poor because of this and this you write in the assignment.' So, I, I did feel the need to, to get better marks for that. Okay, if I'm going to get better marks, I have to do exactly what Mr. K has been telling me.	Although all her lecturers have made a contribution, Mr K stands out because of the explicit guidance he gave her with writing. He did not act as a judge of her writing, but helped her develop. When she failed, he would say why, and how she could improve. This was how she became aware that she needed to do 'exactly as Mr K was telling me'. She now describes success in terms of doing, (that is doing what he requires) rather than information.

Thandi

T1: My mother asked me, 'so – you failed twice! What are you going to do?' I told her, 'engineering'. 'Haai, Engineering? You failed B.Sc. and you think you can do engineering!' And I told her that's what I wanted to do the first time.	Although her mother was cynical about her ability to do engineering after she had failed B.Sc. she was set firmly on doing engineering.
T2: You have to tell them [workers] why you are changing it, tell them all the reasons and make them understand not just like you have to force them. Make them understand because they know that more than you according to themselves they have been there more than you. So, you cannot just come and tell them what to do.	She is aware that workers may resist her proposed changes as they have been there for longer. This requires that she establish her credibility so that they will accept the changes she makes. She acknowledges the workers' belief that they 'know more than' she does, and she thus tries to negotiate the changes with them.
T3: They think that people are confident because they're clever - they think that you should always know the answers to everything, even if you say that you are doing engineering they don't ask 'which engineering are you doing?' like they just assume that an engineering student has to know how to do this, like to fix a globe!	She is slightly amused by people's perceptions of her as confident and clever, able to fix anything just because she is an engineering student. She feels they have a poor understanding of what her engineering entails, and that their confidence in her ability to fix things is misplaced.
T4: (laughs) Sometimes you have to make them understand like that, you have to tell them other, like those men, if he's someone who is at your level like in tertiary you can tell him – no, I'm not doing electrical engineering! I'm doing this and this, but it's difficult when it's someone at home.	She feels she is able to correct this misperception among fellow students, but that it is more difficult to adjust her family's perceptions.
T5: Most of the people like in our, like in Transkei, they've not gone to tertiary, secondary even, so if you are in tertiary they think highly of you.	In her home community (Transkei) she is highly thought of as higher (and even secondary) education is not common.
T6: You don't change. You have been with them when you were in high school, when you were in primary, there's nothing that has changed. It's only that they know that you are doing this now. You are just like	She feels that, despite her community's changed perception of her because of her education, fundamentally she has not changed. She has lived with them since primary school, and does nothing

them. There is nothing you have changed, nothing, absolutely nothing. That's because you are coming from the Technikon. That's all there is.	differently with them now than before. She feels the same; her education is an addition to her old self, but one which alters her community's perception of her.
T7: (Giggles) Er, sometimes - it depends. Like, what they think of me at that time, ja, that moment. But there are sometimes you feel like, 'I don't want this thing' like, I want to be treated the way I was treated before. But sometimes you think, 'Oh, (laughs) they are giving you wings!'	Their changed perception of her makes her self conscious and a bit ambivalent about it. Sometimes she feels burdened – 'I don't want this thing' - and other times exalted – 'they are giving you wings' - by their expectations of her.
T8: Ja, like when you are doing engineering, …- I don't know where did that come from – you have to be a tomboy, you have to do dreadlocks, you must wear baggy jeans. I'm used to doing extensions, and I don't wear baggy jeans.	She is aware of an expectation among certain people that because she is doing engineering, she should be a tomboy and dress accordingly. She enjoys dressing fashionably and is not tomboyish. .
T9: So many people will ask me 'Why did you do engineering?' And I will ask ' Why not?' And they'll say maybe, ' I think you should be a presenter in a TV, something like that'. But I don't understand them, because when I ask them like why should I go to the TV not the engineering part, they don't say like the straight answers, like because you are not like this and this. But I can see like why they are saying that. I think there is this thing that when you are an engineer you have to be like a tomboy.	Her appearance prompts people to ask why she doesn't do TV presenting instead. She sees no contradiction between her image and engineering, and challenges people to explain why they think this. She is critical of their evasive answers and stereotyping. She feels there is no justification for the tomboy stereotype.
T10: I, I think it's my image right, it's correct. And I - I won't change it even if I go to a working place. I'm still going to be like this.	She is contented with her image (physical appearance) of herself as an engineer and resists pressure to change it, even when she goes out to work.
T11: For an engineer it's not the outside, it's only on the inside of you, only in the mind not the outer… like the physical part, it's only in the mind, because to do engineering or like the things which you are going to do, they're all coming from the mind. You don't have to be, to look like one, or talk like, yeah, it's only in the	She believes that 'being an engineer' is determined internally, it is in the mind: not externally; it is not 'physical'. It is thus not necessary for her to look or talk like an engineer. To her, her mind, and not her manner of dressing or talking, identifies her as an engineer.

mind.

T12: It's still the same because you find that some others, they even change the way of speaking. I use my own words - just words that can be used by everyone.	She describes her manner of talking and her voice as unchanged, 'still the same'. She uses ordinary words, words used by everyone.
T13: It's knowing that when you work you have to bring a change so, the way you think it has to be like, not like er, different from other people but it has to be, have something new or added on. You have to have something to add on. Like, when we go to work we have to improve, that's the main thing that we do.	She is hesitant about saying her thinking is different to other people, but none the less she feels that she now goes beyond the everyday and offers something new or added on. She has appropriated the commitment to improvement and feels herself responsible for making changes and improvements as an industrial engineer.
T14: So, that is one thing to know that in future I am this person – we have to make changes. So, I might as well start practicing now, and do like just little things that will help me.	Because this will be her future task and responsibility, she believes that doing that now already, as practice will help her.
T15: When we get there [factory], like the (laughs) the operators they're not used to females in (laughs) the workplace - they were fluiting and doing all, all that noise.	On her first day at the factory she was embarrassed and thrown off balance by the workers who whistled at the women when they were taken on an orientation tour.
T16: And we, we were so like, oh- even don't concentrate on what you are being shown now. You are afraid of, of, it's the first time you've been in the workplace- afraid and you don't know what to expect.	This made it difficult for her to concentrate on what they were being shown, and furthered her anxiety about not knowing what to expect.
T17: The second day we had to go alone (laughs). He just like went and said, you are going to work here. On that day we had to do time studies Phew! And you have to work with three operators - you had to choose three operators.	On the second day they had to begin working on their own. This was stressful. She had to conduct time studies on three operators, a task that caused her anxiety.
T18: So like to think about that – Ai! When you are going to be in your work place, like it's going to be different - not what you think. Like when you are studying, you think okay when you are employed you are going to do this and this. When you are	This experience has made her aware that there is a big difference in learning about doing something and actually doing it. She sees that doing it is 'not that easy', but that is what work will be like. Actually being 'in it' was a significant

actually in it you can see like how it is going to be like.	learning experience.
T19: Er, I think I learnt that you have to be strong, you have to take like everything as it comes. But, I think working with operators you have to… make them understand.	She realized that she had to be strong and flexible. To obtain their co-operation, she has to make her purpose understood to them.
T20: What they [lecturers] told us is we must not make them angry or must not hide anything from them, like if you cover their time you are hiding. But because we are doing it front of, we never expected something like that…	Although the lecturers told her to be open and transparent with the workers to avoid antagonizing them, she had not expected their hostile behaviour. The 'doing' has more impact on her than the 'being told' which is passive.
T21: But now that I'm using computers, I don't hate them. I'm using computers even more. I do go to computers almost everyday and I just like them. I go to the Internet, sometimes I play or something like that. And even in CAD we do, we're using computers. And even when we do our assignments, we go to the Net to find information.	She now enjoys using computers and is comfortable using the Internet and CAD to support her work. She uses computers daily – for recreation as well as study purposes.
T22: Yeah, I think it's now different from the first year like we were given assignments by our lecturer Mr K, who used to give us work in every subject of his, a lot of assignments. Wow – during our first year, we had no clue what an assignment is!	In her first year she was overwhelmed by the many assignments set by Mr. K. She 'had no clue' how to do an assignment at that time.
T23: We just know about an assignment, but you never knew what you have to do, where do you have to find the information. We didn't even know how to find the books and information! Even that you have to go to the back of the book to see key words so that you can find information.	Although she knew about assignments then, she did not know where to find information, how to find books, or even how to use an index in a book.
T24: I think Mr K told us like on the second year. After seeing that we have, really have no clue.	The lecturer only told them all this in their second year when he saw they 'had no clue'.

T25: We didn't even answer the question like at this one (pointing), they say that you must do like tensile testing. If it was like a theory, or something which is to do with theory, you just go to the book, find the book which has only tensile testing. You don't mind about what he wanted you to do about tensile testing – whether he said like maybe he said, what are the machines used for tensile testing? You won't understand that, you just under (stand) how is tensile testing done.	She did not understand task requirements, nor develop a focused answer for an assignment. She would match the assignment topic with a book topic and recount information, irrespective of its appropriateness. This amounted to knowledge-telling. She did not even realize or 'understand' that the assignment might require something other than the treatment in the particular book she had found.
T26: Just tensile testing, and then you go and find the information, and it doesn't matter. You ask others, 'where did you get the information? In which book did you get information'?	She was unable even to locate her own sources and obtained information about the topic by asking classmates for sources they had found.
T27: And you go – right straight from the book, write it down as it is. You don't read it, you don't like check if it's really what is wanted, you just, you just know that it's tensile testing. It's like photocopying! (Laughs).	This information she wrote out 'straight from the book', 'as it is'. She would neither read it, nor check whether it was appropriate, all that mattered was locating information on the topic. She admits guiltily that her approach was like photocopying.
T28: Like he did give us a mark, some marks because, he thought maybe we did not have a clue, but he told us then if you are doing an assignment you have to have a, have a uh, okay, a cover page, It must have a name, your student number, like the course you are doing, and even the question of the assignment. And the second page, it has to be the index page. And then, you will have to have an introduction, it must be not more than the, not more than one page. Maybe, half a page, or full page. And then the text, and then after that the conclusion. And then the bibliography. I never even knew there was a difference between bibliography and references!	After the lecturer had accepted and marked this work, he told them how to set out an assignment. This included detail about form, presentation and structure. She only then realized the difference between references and bibliography. In her account of what they were taught, she focuses strongly on having sections of content in sequence, but she says nothing about discourse.
T29: And, and you must answer what you are asked to do, not just go and check	She's amused now to say that he needed to tell them to consider task requirements and

(laughs) the, the name of what did lecturer say: Tensile testing, tensile testing - just go check for any book which has tensile testing.	not just try to match assignment topic with book titles as they had been doing.
T30: But ja, but now, I read the question, like and, and understand it first and then go, go to the books, okay, see what is wanted, and not write exactly what is written in the book.	She now reads the question to understand what is required before consulting books. She no longer copies verbatim from the book but selects to match task requirement.
T31: I do sometimes take things down, of the things which are written in the book but, now I put it in my own words and even add on my own information, and even go to the Internet. And at that time we didn't even know about computers, like that you can find information on the Internet.	She now takes information in her own words from the book. She incorporates her 'own' information and information from the Internet. Previously she did not even know that the Internet was a source.
T32: So, now, so when we do an assignment, we don't go like we did, like, like we used to do before, we don't like hear anyone asking 'where did you get information?''Did you get the project?'. But you find out everyone has the information you don't know where did he or she get it from, but they do have the information, and it, it makes sense now.	She no longer needs to ask classmates for information sources, but manages to find information on her own. It is no longer about getting information, but about making sense. There is a shift from accretion to appropriation.
T33: Ja, like sometimes we even go to the lecturers and ask to tell us what does he actually need. Ja it is [helpful] a lot because he's the one the one who wants the work done.	She now goes directly to the lecturer to ask what the task requires. This is helpful because he knows the task requirements best. She does not see her role as a writer as solving a rhetorical problem, but as doing what he wants.
T34: Phew! I think it's because we were still new, I don't know. Maybe I was still afraid of the lecturers, I really don't know, because not all of us – even the schools, I think they affect, the schools where you come from.	Looking back she is now baffled by her reluctance or fear to approach lecturers in her first year. She ascribes it to her inferior schooling, saying not all students experienced this fear.
T35: Ja, they do because at the other…, like there were three, about three whites. They had these beautiful assignments –	She noticed that white students who had come from different school backgrounds produced 'beautiful assignments' that

they had this flipfiles, and a cover, a beautiful cover page. And when they, when we went to submit our assignments I said, 'Hau! My god! Heh! What do they think they are doing – doing a thesis?' (laughter). And, and I didn't even know that you can buy these – just from the bookshop. I dunno why, I, I thought that it's something from a company you know. And they, like the way they wrote it, I was sure that they did not do it by themselves (laughs) they were helped – maybe by their fathers.	flabbergasted her. She didn't even know that the plastic covers of their assignments could be bought at a bookshop. She was so impressed by their work that she was convinced their fathers must have helped them. She found it inconceivable that they could have written such assignments themselves. She is now amused by her naïve amazement then.
T36: But, like from that schools that which they came from, I think they were given assignments to do. We were never given assignments in our schools. It is [different] from school to the Technikon.	Her school had never given her assignments to do, but the white students' schools had. She experienced a big difference between school and Technikon learning.
T37: And, when you come here, you find out that it's too much work for you. Like you are not used to this, but as the time goes on, I think the second semester then okay, you know. You, you have to divide your time. Which we did not know – I think that's our problem, like at our schools, like the way they teach us.	Initially the workload overwhelmed her, it was 'too much work' but as time passed she learnt how to manage her time. She feels her school did not prepare her for this – in fact, she ascribes her problems to the way she was taught.
T38: You have to concentrate, listen to the lecture and you have to ask the lecturer questions, which means there is something you are understanding or something you are hearing, by giving feedback by asking some questions you are listening and you are understanding what he says and with it you are learning.	She discovered that she needed to interact with the lecturers in class. Engaging through asking questions means that 'there is something you are understanding', and 'with it you are learning'. She began to realize that learning is something active she must do.
T39: And I think like during the first semester, I didn't even concentrate in class. And I, I just (laughs) sit - and I know like I will have to highlight this. I didn't know what was happening – then I'll go and read it in order to understand I have to go and read it on my own.	She now laughs at her lack of concentration in class in her first year. She would note what work was highlighted, but couldn't cope or follow the discussion. She read it on her own afterwards to understand. What she was doing with the information in class and afterwards was different.

T40: We were not concentrating in class and if you are looking at the lecturer, you are not listening to what he's saying – you are just, you can see, like opening and closing the mouth, but you're not actually hearing, hearing what he's saying. You are just looking at him, so he can think that you are listening at him, and then you draw or do whatever.	Although she wasn't concentrating, she mimicked listening behaviour to satisfy the lecturer. She was distracted by doodling, and made no attempt to make any meaning of what he was saying.
T41: I cannot read straight from the text-book, I have to make my own notes. And then I, I have to study those notes not once, maybe three times because I do not know it just from the beginning. I have to make myself some questions. Ja, I see it in my mind.	She cannot learn (read) straight from the text book, but makes her own notes which she studies repeatedly. Making herself questions about it helps, and ultimately she is able to see it in her mind.
T42: So, when I come to the question paper, it's not in the book now, it's just a new question, so, it's, it's confusing like I wonder what is this? What is he talking about? But I know it it's only that I, I memorized it, something like that.	She knows now that if she memorizes the exam question will be confusing as the information will be asked for differently to what it is in the book. She will be asked to transform the knowledge from the book.
T43: Maybe I memorized it like, like this and this page. I know it's in this position, I know what is wanted ja I have to write it in a different paper so that I, I don't memorize the way it is in the book. In my notes, I know it as it is there. These are the functions of this. These are the advantages of, of this.	From memorization she can only visualize the information on the page in the book: it is untransformed. To avoid this she writes her own notes. In her notes the knowledge is transformed and she feels she knows.
T44: If I read it straight, straight from my notes, I know it. Like in the book, I know it as it is in the book, not as if I know it like understand it or in my mind. That's why I have to, after reading it again from the notes I have to write like some question.	Unless she makes her own notes she doesn't transform or appropriate the knowledge. She distinguishes between knowledge in the book and knowledge in her mind.
T45: As I'm writing I'm also studying, like I'm understanding it. The way I make my notes it's not, I don't take it exactly from the textbook as it is. I make it like in my own notes. Simpler, so that I understand it.	Writing her own notes in a simpler way is how she understands and makes the knowledge her own.

T46: You are doing an assignment,, … to tell you the truth (giggles) I think like most of the time you don't learn like, like it's not something you learn like when you have to do it like on your own, it's ….I think it's something like you, you do it just because you have to get marks, not for learning something out of it.	She admits with slight embarrassment that she does not learn from writing an assignment for a lecturer, but does when she writes for personal study. She can't see the purpose of writing an assignment: it's just something you do in the course of the semester because that is what the lecturer requires. It has no inherent value.
T47: Noh! [I don't learn from doing an assignment] (Laughter). I have to tell you this serious, no. No.	She is adamant that she does not learn from doing assignments. The very idea seems laughable.
T48: …people will put it [question] in their file, never see it again, until a week before. They think, hey, an assignment is going to be handed in next week. You find out, you go and just find out information. Of course, you, you do try to make something, you memorize something that's going to make sense to him, but I don't think we actually study that what is it that he is thinking like, what does he wants us to know by writing this assignment.	Assignments are left till a week before they are due. She tries to find information, and make something that will make sense to him (not to her). She writes just to satisfy the lecturer's demands not to understand or learn for herself. She memorizes for the presentation but feels she does not actually get to know what he wanted the class to learn from the assignment. There is a sense of going through the motions.
T49: Ja, [an assignment makes sense to the lecturer] but when you learn, it's, it makes sense to us.	This is different from learning where it must make sense to her. Writing is not part of learning.
T50: It's different the experiential training, cause you are actually doing it - you do it, you are in the work place, like it's not a question, it's nothing like 'you have to do this'.	She thinks writing reports in industry is different as it is authentic - based on something she's done herself, not an artificial, externally imposed question she needs to answer to satisfy her lecturer.
T51: But you have to come up with something you did, like it's all from yourself you didn't go to a book or the Internet, to find information, something like that. It's actually coming from you.	In a report her experience (not a book) is the source of information. It is creating a meaningful account in which experience is transformed into knowledge.
T52: Ja, because you did yourself, and then want to write it. Unlike when you find the information, and then you like to check the information and try it to make sense the way he wants it and to give it to him. Then	Doing something herself and writing about it allows her to really know it. It is not so in an assignment which is about 'finding information' and trying to make sense of it in the way the lecturer wants and then

you actually know it when you do it from experiential training.	giving it to him.
T53: We only check our marks (laughs). We do open it, and then we just see 'Did not follow instructions' We don't check whether, what instructions we didn't follow. And like what's on your mind now is he has already given you your marks, there is nothing that you have to change you've done it, you already have your marks like you don't actually like try to find 'why did [I] do that mistake, or, er maybe next time I have to …' No, you don't think about next time. You are thinking about your marks now, that's all.	All that matters to her when an assignment is returned is the mark. She noticed his comment about not following instructions, but did not explore where or how she had gone wrong. As the mark is final there is no thought of improving the assignment, or even of what to do in future assignments. The mark, not her development, is what matters.
T54: In the test you have to study, and then you have to answer to the questions – unlike the assignment. Because passing the test you have to, it's like you are speaking for yourself.	To her the difference between assignments and tests is that assignments don't have a question that needs to be answered. In a test she has to speak for herself: formulate an answer and transform knowledge.
T55: I think the difference is when you are writing,…you are just taking, you, you are taking information like from somewhere else. You don't know about it. You read it and then you write it and then you don't think it afterwards, like what it means, that.	Writing an assignment differs from a live presentation as it is 'just taking information from somewhere else' without knowing it or reflecting on its meaning. She writes assignments without considering the meaning.
T56: Because when you know that you have to present it, then you have to understand what you are writing because they are going to ask you some questions back, and you have to know what you are talking about - unlike if you are going to just give the lecturer an assignment. Then you just take the information from Internet, just print it, then, take the information that you think the lecturer wants and give it to him.	A live presentation requires understanding and knowledge transformation. An assignment requires only that she take the information from the Internet, print it and give it to the lecturer in the way he wants. She is a conduit for information, but does not process it at all. She second-guesses what he wants.
T57: Like you are not going to, to rate it into a certain, make it, make yourself understand what they are talking about.	For an assignment she makes no attempt to understand or transform the knowledge.

T58: It [industrial report] is different because that is what you actually do. Even if you did not do it, like it's something that did not originate from you it's somebody else's thing, but you also did it and find out that that person was correct about what you were saying, so you do know it. You know, you also know how to do it you know how did he come up with that conclusion or do those things there.	She feels that in a report even if what she did is 'something that did not originate from you' but is somebody else's idea, by doing it herself and then writing about it, she discovers the value of what the other person did, and is then able also to know it. It is not just taking and possessing, but internalising and understanding.
T59: I think it's a little different [from an assignment] because when you are writing a report in industry it's, you are writing it from something you saw, from something you were, were doing there, and which you were in at that time. Unlike an assignment it's just an information from someone else.	An industry report is different from an assignment – it is based on something she did and saw, something she was involved in. An assignment is 'just an information from someone else'.
T60: This person is telling you how does this thing happens, so you have to know from what he's telling you it happened this way. And then you have to go and tell the third person that first person, they told me that this thing can like happen this way unlike in industry where you do it yourself.	In writing an assignment she is reduced to an intermediary between author and lecturer. She has to know in the way the author tells it, and feels this way of knowing lacks authenticity. It's knowledge that comes from accepting what she is told, not from doing, which would be more authentic.
T61: When you do the writing, I think, it actually makes more sense to you. Because when you write it, I think there are some things which you find out that - I didn't do this and then you have to go, or you don't understand maybe, how did this come up? I think like writing, like it makes you think like more even more, about what you are doing as you write, as you write some ideas will come, as you write, ja.	Report writing requires that she make sense or meaning from her experience. She discovers the meaning through reflecting and composing. Such writing forces her to reflect about what she has done, and what it means. Ideas about the significance of what she did, 'come' to her as she writes.
T62: I don't think that it, that my writing is okay, and sometimes I like, I don't even know if it makes sense to the lecturers.	She feels her writing is inadequate and she is not sure that it makes sense to the lecturers.
T63: [How do I know] If it did make sense? No. Like maybe sometimes, like if they put in the table like this like they say theory	She has not considered ways of knowing if it makes sense to lecturers other than by looking at the mark. There is no way of

you got this, and practical you got this, but you don't know where you went wrong. But you are, like this assignment we were given only five minutes before we went out of the class.	knowing where she went wrong, and no time is allowed to discuss it with the lecturer. There is no feedback to learn from.
T64: They have told us that you have to write an introduction and conclusion, but no one has told us what, what is needed actually in the introduction, what you need, or what is actually needed in the conclusion. I, you know the assignment, that is the cover page the, …the index, the text, introduction to text, but you don't know what is actually – what is needed.	Although she has been told to write an introduction and conclusion, she does not know what is 'actually needed'. She knows what structural elements a report requires, but not how to write them. She feels she can't do things with or in a text.
T65: But, to tell you the truth … this one is the real truth, when you write your introduction and conclusion, you go straight to the textbook, or you will ask someone 'did you write the introduction?'. And you'll find out that she says I just got it from other books, like she doesn't, she doesn't care what does it say, she just takes like an introduction from another book like you don't know what is actually the introduction. I don't know what (laughs) you have to do in the introduction.	She confides with abashment that she – like others in the class – doesn't write the introductions and conclusions to their assignments, but copies them from other sources regardless of whether they are appropriate or not. She feels that she writes the same in the introduction and conclusion because she doesn't know what to write in either.
T66: Like most of the time, what the lecturers think … we are doing, or we are getting, is not what they think. Just because – they, even if you can, you can have marks, but you actually find out that you don't know what actually was happening. You just memorized.	She believes lecturers don't really know what students know. Her marks indicate that the lecturer thinks she knows something when in fact she doesn't know 'what is happening'. She is quite forthright in acknowledging that by memorizing, she can obtain marks without knowing.
T67: I, no [I've not learnt to think and write] not as a, not maybe like as an engineer, maybe for that course. Ja, you can like understand what is being said, or what it is about - but others you are memorizing. You are just studying just to pass it.	She feels she has not learnt to think and write as an engineer. She focuses on the course and passing, even if it means she has to resort to memorization to circumvent the thinking and writing like and engineer.

T68: Of course we did it in class, and we were taught how to do it, but when you come to the industry, you find that you don't know how it was done. If you just memorized it, I think I don't know, I don't think you will know it. They'll have to teach you again in industry what to do.	Although she was taught things in class, she believes in industry it will become apparent that she does not know how to do things. She feels dissatisfied with the outcome of her memorization and is convinced she will have to be taught again in industry.
T69: And, and then another time, I didn't know you have to use a set-square to draw a straight line and then this friend told me 'use the T- square'. I told her 'why should I use the T- square? I want to use the set-square' Like the T- square is heavy! So I want to use the small one. So she didn't want to argue with me, so she said, 'okay-draw with the set-square!' I drew the line and I showed her, 'it is straight this line'. And then she took the T- square and put it on the corner of the drawing table, and showed me that the line was not straight. And I didn't know at the time that you use the T-square to make the line straight, straight, straight. Ja, I didn't know then.	Basic things like how to get a dead straight line she learnt from a classmate, not lecturers. She had chosen to draw with a set square because it was lighter and easier to draw with. A classmate pointed out that to get a straight line she needs to use the T-square. She turned down this advice, confident that her line would be straight. In the end the other student showed her with the T-square that although it seemed straight it was not truly straight. Her intuitive, personal choice of procedure was not adequate in a professional context. This she discovered with the help of a peer rather than a professional.
T70: Mr vdM, he gave us this drawing I think it's was nine dots, and he said, ' join these nine dots, with without lifting your pen' So we tried and tried, but there will always be this dot which you didn't join.	She describes an incident where the class was given a brainteaser to complete. The class struggled as it required unconventional thinking to solve it.
T71: So he, he showed us how to do it. Like we were choosing the main routes; it was not specified that 'do it this way' but we thought it has to be done in this way (showing with her hands). Ja, when I discovered that you can go any way you want to! Ja, like something like that, you have to be creative in thinking and we didn't use that! (Laughs)	When the lecturer provided the solution she realized how limited her thinking was to 'main routes' and how difficult it was to think creatively to solve problems. From this experience she discovered that thinking can be creative or conventional. Certain problems required creative thinking.
T72: Oh, you don't only study them [terms] like in the books, you have to see them somewhere, more times, being done practically. You have to see it by your eyes – you don't only have to listen.	She got to understand terms not by studying them from books, or from having them explained, but by seeing them done in practice a number of times, 'with her own eyes'.