The literature review as classroom genre for teaching ESL postgraduate engineers critical analysis and writing skills

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Abstract: ESL postgraduate engineering students at the University of Melbourne enrol in a discipline specific EAP (English for Academic Purposes) program intended to develop their linguistic and academic skills for successful postgraduate study (Melles, 2002). While simultaneously attending to language issues in writing, a key concept of the curriculum is the development among students of critical analysis abilities (Melles, 2003). A series of writing and speaking tasks, including a three thousand word literature review, are used to progressively develop such skills and provide an appropriate assessment framework. The literature review, in the course is used as a 'classroom genre' (Johns, 1995) to initiate students into the academic culture and discourses. In this paper, I define the nature of critical analysis in the program, features of the literature review in the curriculum, and student responses to this framework. I conclude with a discussion on the relevance of applied linguistic contributions to academic literacy in engineering.

Introduction

The Faculty of Engineering, University of Melbourne, enrolls a culturally and linguistically diverse group of ESL (English as a Second Language) students who arrive in Australia with heterogeneous levels of English proficiency, cultural backgrounds, and prior educational experiences. The University stipulates for some students that they must complete an EAP program during their first semester, and since 2002, a course has been offered to cohorts averaging twenty-five students per semester who have elected or been compelled to take the course as an induction into academic conventions and practice (Melles, 2002). Recently inclusion of students from non-engineering disciplines such as Chemistry, Land and Resource Management, and Information Systems have lead to a shift in the focus exclusively on engineering genres and content towards a format that foregrounds science and engineering as allied disciplines.

In teaching students, who are simultaneously pursuing discipline specific coursework and research programs, a conventional ESL curriculum limited to grammar and vocabulary is inadequate to preparing these students to succeed in their diverse projects. Students from Asia, who constitute the bulk of enrolments, come not only with limited English proficiency but also with academic practices that make their negotiation of critical thinking and writing difficult. Ballard and Clanchy (1984), for example, have referred to reproductive learning styles among these students. Also, as Jones and Freeman (2003) note, for many ESL students copying is 'a natural process, with cognitive roots in imitative learning'. Ward (2001) also notes that engineering students in Thailand learn strategies to avoid reading engineering texts in English in their undergraduate training, a practice which may be wide spread. Encouraging
quality revision and writing work from students involves not only exploiting this initial
drafting stage but also having very explicit writing formats (templates), and very clear criteria
for assignments.

Limitations of conventional ESL Engineering approaches

A number of proposals have been made for collaboration between language specialists and
Engineering faculty (Pattison, 1994), to negotiate better curriculum outcomes for students.
There have also been calls for Engineers in particular to take more seriously the clarity of
their communication through English (Oakley, 1998), to explicitly focus on cultural
differences in rhetorical structuring of texts (McDaniel, 1994), and, in general, to take
seriously the English and communication skills needs of engineers in a global industry
(Riemer, 2002). In Australia, Pantelides (1999) proposes that integrated language across the
curriculum programs are needed by undergraduate engineers. For the humanities/applied
linguist lecturer, the process of attaining a form of literacy in the discipline, as Collins, Li and
Cheung (2000) point out, takes time and effort. The recognition in texts within the field of
engineering of the importance of coherence and the functionalist approach I take to this
provides a point of contact across this applied linguistics and engineering 'gap'. My own
experience has been that the language/content split is an artificial constraint used to bolster
existing professional boundaries but practically irrelevant and one most language specialists
ignore.

Conventional ESL approaches to teaching engineering language places emphasis on the
vocabulary and grammar acquisition of 'typical' structures such as the passive sentence (eg.
Glendinning & Glendinning, 1995). A focus on a specific engineering vocabulary may not,
however, be apposite since there 'may be no such thing as General Engineering English'
(Johnson & Johnson, 1988), and, as Brown (1988) also seems to have shown, the difficulty
second language students face in reading engineering texts can not be attributed the
engineering vocabulary itself. Hyland (2002) has also noted that the so-called impersonal
voice, ie. passive dominated, of academic writing is a misguided representation of actual use
in engineering and other empirical disciplines where both active voice and personal pronoun
usage, albeit less frequent, is found. Traditional ESL texts also reduce reading and writing to
'rhetorically simplified events' that 'teach forms of discourse they (teachers) themselves
rarely or never use outside of the classroom' (Adam & Artemeva, 2002); they may also
include source texts such as newspaper which do not expose students to research genres
(Porcaro, 2001).

As Feak (1996) points out such texts take a very controlled and rather repetitive approach to
language learning, and require substantial supplementation for students to engage with
language and composition issues. More robust textbooks addressing the needs of ESL
engineers (eg. Huckin & Olsen, 1983; Huckin & Olsen, 1991) and postgraduate students (eg.
Swales & Feak, 1994) have appeared which attempt to balance a focus on language and
discipline specific rhetorical choices. In their focus on specific academic and professional
genres, eg. research reports, these texts provide a much needed complement to conventional
EAP texts. They are not, however, sufficient in themselves to deal with the individually
situated learning of students and their need to appreciate and practice critical analysis through
writing. Such issues include but also extend beyond generic language and academic skills
strategies deemed appropriate to all university students, and the modus operandi of learning
skills centres (eg. Davis & McKay, 1996), which abstract academic literacy from social
context (Hyland & Hamp-Lyons, 2002).
As Hyland (2000) notes, ‘academic literacy is unlikely to be achieved through an orientation to some general set of trans-disciplinary academic conventions and practices’ (p.145). Numerous guides to writing in the sciences and engineering offer advice on good style to native speaking students (Alley, 1996; Day, 1992; Kirkman, 1992; Silyn-Roberts, 2000). Such texts provide different levels of detail on the linguistic choices that determine engineering style. Although, as Alley (1996) claims, no absolute consensus exists among engineers, style in engineering writing may be seen as a combination of rhetorical, imagistic, and language choices specific to writing purposes, audience, and circumstances. Second language students can be introduced to the norms and conventions of communities of engineering through discipline specific collaborations between applied linguistics and engineering faculties. In fact, as Tansely (1996) notes, engineering schools seem to not include explicit teaching of the professional culture of engineering.

**Genre-based pedagogies for teaching ESL engineering students**

In textbooks directed at native speakers, the socio-cultural characteristics of the discipline are not foregrounded but such a focus is essential for second language students. In response, practitioners and theorists of composition have adopted a social constructionist approach to the evolving genres of speaking and writing (e.g. Gosden, 1995). As Hyland (2000) proposes, the basic idea is that ‘academics work within communities in a particular time and place, and that the intellectual climate in which they live and work determine the problems they investigate, the methods they employ, the results they see, and the ways they write them up’ (p.6). Social constructionism has implications for discipline specific genre-based teaching of academic literacies. Johns (1997) suggests that the ‘socioliterate’ approach to academic literacies incorporates traditional concerns with text form and schematic knowledge while emphasizing that ‘all literacies are, in fact, social, intertextual, and historical’ (p.16), and students need to be made aware of the social milieu or discourse community to which texts speak, the ways that texts ‘call on’ other texts through citation practices, and how current academic practices are bound to change.

A professional discourse community such as engineering may be seen as having a set of common public goals, mechanisms of intercommunication among its members, participatory mechanisms for information and feedback, a conventional set of genres for communication, a specific lexis, and a threshold level of accredited members (Swales, 1990, pp.25-27). Swales (1990, pp.45-58) identifies genres as a class of communicative events or activities with a shared set of communicative purposes for such events. There is variation in the prototypicality of textual instances of genres, constraints on allowable contributions in terms of content, position, and form, and a nomenclature for genres, e.g. memo. Linton, Madigan and Johnson (1994) note that in one sense (professional) disciplinary genres are ‘unteachable’ and must be learned through experience; Pogner (2003) has highlighted some of the complex social interactions that underpin workplace engineering genres. Arguing for the role of the general composition course and the use of ‘transitional classroom genres’, however, Linton et al. argue that writing faculty can play a role in raising awareness of the ‘three categories of conventions which occur in all academic genres’ in the natural and social sciences. These they list as conventions of (rhetorical) structure, referencing, and language use. Johns (1995) makes a similar distinction between authentic (AG) and classroom genres (CG) which is applicable here.
Critical analysis through literature review

As Swales and Lindeman note the literature review ‘is a part-genre or sub-genre of wide significance in the academic world and in graduate education’ (p.107). However, although the literature review has a natural place in theses and dissertations as a genre it does not have a universal form or significance. Holtom and Fisher (1999), for example, suggest it may be necessary in certain ‘particularly theoretical disciplines’ (p.38); their only other comment on reviewing literature is to ‘look through any literature that might be relevant to your project’ (p.65). Evans (1995) also casts doubt on the general relevance of a literature review in thesis and report writing by referring to a critical review as ‘one approach to thesis writing’ (p.69), although he adds the caveat that it is impossible to ‘critically review’ until some experimental work has been done. Moore (1992), writing about biology, makes the important point that a comprehensive review of the literature is not required in the introduction to a research paper (p.242) since the review article now does this and science writers only need to provide ‘enough’ background to situate the research. Gustavii (2003) also notes that the introduction to a research article with an IMRD structure should contain ‘specific findings by others that you are challenging or have developed in the study you are presenting’ (p.54), adding, however, that in certain disciplines, eg. nursing, occupational science more space may be required (p.55).

Some engineering textbooks deal with the literature review in details outlining stages, purposes and processes (Silyn-Roberts, 2000, pp.78-91). A review may be incorporated in genres of engineering writing such as the lab report; the final year project in the engineering curriculum is an example where such an extensive review takes place. Shaw (1995) suggests that applied linguists have been reluctant to intervene in the literature review in engineering since they are too ‘personal’; he suggests, however, that rhetorical analysis using schema can help. Swales and Lindemann (2002) note that while we have numerous publications on macro features of literature reviews or on micro linguistic features such as tense use etc., we have ‘very little information on how writers get from the macro to the micro level’ (p.108);

Silyn-Roberts (2000) and Reed (1998) suggest that finding sources and synthesizing information are two of the key tasks in performing a literature review in engineering. Learning how to use sources and evaluate their claims forms an essential part of reviewing the literature. Genre conventions provide necessary form and content boundaries to otherwise open writing criteria. Levis and Levis (2003) note that students have difficulties in managing multiple references, defining a research question, and discovering that articles may not overlap in obvious ways. The final year project is the context for a discussion of literature reviews in students project reports by Krishnan and Kathpalia (2002), who note how second language students in Singapore employ plagiphrasing and other compensatory strategies in writing their literature review due to language. They argue that ‘these strategies need to be extended further to master the art of writing academically sound literature reviews’.

Generic definitions of critical analysis for university students abound (eg. Allen, 1997; Baker, 1989; Bean, 1996; Walters, 1994). In North American composition textbooks ‘critical’ may simply imply reading of humanities based fictional extracts, focus on rhetorical structures, eg. comparison and contrast, and personal response to reading questions (eg. Scull, 1987). Atkinson (1997, p.72) suggests critical thinking is a social practice that has its origins in culturally determined sets of behaviours that cannot be easily defined, and is, therefore
'unteachable'. Benesch (1993) calls critical thinking both 'a democratic learning process examining power relations and social inequalities' and rejects, as others do (eg. Gieve, 1998) the idea that it cannot be taught. Belcher (1995) approaches the teaching of critical analysis by using book reviews as models noting rhetorical criteria, such as readability, credibility, and evaluative language which she brings to the attention of students. Braine (1995) identifies paraphrase and summary as key teaching issues for composition classes and, based on the frequencies given above, suggests discipline specific classes reduce their focus on the research paper.

Within the general academic community, citation practices within disciplines of engineering, e.g. electronic and mechanical, have been shown to be different (Hyland, 1999; Tribble & Thompson, 2001), and within disciplines different genres, e.g. theses and journal articles, frequency and type of citation differ (Thompson & Tribble, 2001). Hyland (2000, pp.41-62) has identified significant disciplinary differences in the amount of praise and criticism in such reviews with Engineering (Electrical and Mechanical) being significantly less critical than other disciplines in evaluating books. Other differences between science and engineering disciplines at the level of dissertation writing have also been documented, and remain under-investigated as a source of information about the needs of non-native speaking postgraduates (Dong, 1998). Bloch and Chi (1995) show that although Chinese and English speaking have different citation strategies these are not significantly different in the physical sciences, and Chinese writers are as 'critical' as their English speaking counterparts.

Given the heterogeneity of student backgrounds and the somewhat ambiguous relevance of the literature review to students, the initial drafts of some students reveal an inability to use the research literature as background to developing a writer position or claim. In addition, a substantial and initially unpredictable weakness among students in sourcing citations, let alone synthesizing previous work, became obvious. These processes and outcomes are embedded in the teaching syllabus outlined below.

**Literature Review as a focus for developing coherent critical student writing**

Reading resources for the course refer to the classroom genres used for assessment, for example the literature review, and oral presentation, and come from standard texts on engineering and science communication and writing, e.g. (Alley, 1996, 2003; Kschischang, 2000; Silyn-Roberts, 2000). During the first four weeks, which culminate in a critical review of an article from the student’s field, we discuss cultural expectations about academic work (Bartlett, Holznkechy, & Thom, 1999), define critical text work (Facione, 1998) and review key aspects of grammar and writing, plus the characteristics of graduate text types, such as the summary (Swales & Feak, 1994). I also include a focus on the notion of text coherence as the underlying principle for adequate academic style (Gopen & Swan, 1990; Williams, 2000). Four assignments (three written and one spoken) incorporate 'critical engagement' as a key marking criteria.

Choice of article for written reviews needs to come from the sub-discipline of the students and meet my criteria, such as my stipulation that refereed journal articles from standard database sources, e.g. IEEE Xplore, are used. I take responsibility for reading the original texts for assignments 1 and 2 and such reading has familiarized me with a range of current topics in the sub-disciplines of engineering. Students are recommended to 'sustain' the same research topic through the assessment tasks so as to build cumulatively towards an extended understanding of an issue. Topic continuity also helps me identify an area with a student. In
the case of the research students, the literature review takes on a different function and value compared with coursework students since it may be immediate preparation for thesis writing. The nature of acceptable critical text work is not fixed. Students are exposed through authentic genres and content in their discipline specific classes to different forms of critical text work. In addition, they come from cultural traditions where existing practices of critical analysis vary. Both sources of understanding then feed into a negotiated form of critical thinking and writing, which I propose through texts and teaching. The outcome in writing and speech, therefore, is necessarily particular, and I while assess on the basis of pre-established criteria, requires that I bear the above mentioned factors in mind.

**Evaluating quality of teaching and critical engagement**

Independent student evaluations of the course have been consistently high across four semesters (2002-2003) ranging between 4.2-4.6 out of 5.0 on quality of teaching. I also ask students to reflect on critical thinking as they have come to understand it, and most point to the fact that it was both relevant to their field, and that their other engineering courses included a focus on this. The following ‘critical’ themes are identified in their responses:

- Other engineering subjects do not require critical appraisal
- Poor language proficiency makes it difficult to critically appraise
- Grammar and vocabulary not critical appraisal should be the focus of the course
- Critical appraisal cross-culturally is not the same
- Critical appraisal is a Western (Australian) approach and not universal nor should be
- This is the first encounter with critical appraisal for many students
- Students recognize they must adapt to critical appraisal to survive in Australia
- Critical thinking helps independent problem solving
- Critical appraisal while familiar is represented in writing
- Critical thinking requires the writer make evident assumptions about shared knowledge

Students have also provided many other insights on the learning process and these observations have complemented the quantitative measures of quality teaching. In addition, the faculty of engineering has embraced the course as an essential component of its coursework programs; proposing that it become compulsory and accredited within the curriculum.

**Conclusion**

I view the teaching and assessment processes as an opportunity for ‘legitimate peripheral participation’ (Lave & Wenger, 1991, p.145) by students in academic discourses and practices. My view of the critical analysis process encompasses the reading, synthesis, and evaluation of research-based texts sources, and the production of a coherent critique of such sources in writing which clearly positions the writer and her understanding of the topic in relation to the field. Belcher (1995) notes that unlike some discipline specific teachers she believes student writers ‘whether native or non-native speakers, are not automatically made critical through subject-area reading’ (p.136). She also acknowledges the debate about whether composition specialists can or should attempt to teach critical analysis, and that students themselves question the relevance and purpose of such teaching. In particular, students from science and engineering often claim that ‘professionals in their field never argue’ (p.137) but rather build cumulatively on each other.
Student and faculty responses to the program suggest that an applied linguistic contribution is possible and can create quality outcomes for students.

References


